Comparing Outcomes of Group and Individualized Physiotherapy Treatment Models for Children with Cerebral Palsy in Ghana: A Quasi-Experimental Study.

MSc. Physiotherapy

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Declaration

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List of Abbreviations

AFO	Ankle Foot Orthosis
BIT	Bimanual Training
CDC	Centers for Disease Control and Prevention
CE	Conductive Education
CIMT	Constrained Induced Movement Therapy
CP	Cerebral Palsy
CPA	Cerebral Palsy Africa
CT	Computed Tomography
ES	Electrical Stimulation
EEG	Electroencephalogram
EQ3D5L	Caregiver vesion of Health-Related Quality of Life
FES	Functional Electrical stimulation
GDHS	Ghana Demographic and Health Survey
GMFM-88	Gross Motor Functional Measure 88
GMFSC E&R	Gross Motor Functional Scale (Expanded and revised version)
GPTM	Group Physiotherapy Treatment Model
GSS	Ghana Statistical Service
HIC	High Income Countries

HRQoL	Health Related Quality of Life
HREC	Health and Rehabilitation Sciences Ethical Committee
IPTM	Individual Physiotherapy Treatment Model
Km	Kilometers
LMIC	Low- and middle-income countries
MACS	Manual Ability Classification Scale
MCSI	Modified Caregiver Strain Index
Mini MACS	Mini Manual Ability Classification Scale
MRI	Magnetic Resonance Imaging
MRPS	Modified Medrisk Satisfaction Questionnaire
NCBDDD	National Centre for Birth Defects abd Developmental Disabilities
NDT	Neuro-Developmental Treatment
NICE	National Institute for Health and Care Excellence
NINDS	National Institute of Neurological Disorders and Stroke
NMES	Neuro Muscular Electrical Stimulation
OT	Occupational Therapist
PEG	Percutaneous Endoscopic Gastrotomy
PT	Physiotherapist
QoL	Quality of Life
SIT	Sensory Integration Therapy
SCP	Spastic Cerebral Palsy

UCT	University of Cape Town
UNICEF	United Nations International Children's Emergency Fund
ANC	Antenatal Care
VAS	Visual Analogue Scale
WCPT	World Conferation of Physiotherapists
WHO	World Health Organisation

Chapter 1: Introduction

1.1 Background

Cerebral Palsy (CP) is a non-progressive neurologic disorder caused by permanent damage to the developing brain during pregnancy, at birth and after delivery, which results in physical, motor and cognitive impairment (Morris, 2007). According to literature, cerebral palsy often results in physical disabilities during childhood (Rosenbaum, 2003). Studies have shown that CP can be diagnosed with complete certainty by the age of two years (Novak et al., 2020; O'Shea, 2008; Velde et al., 2019). In addition, children above 12 years are anticipated to show less significant changes in their rehabilitation outcomes (Yalcinkaya et al., 2014). According to the Centre for Disease Control and Prevention (CDC), the Spastic type of CP is the most prevalent among children, making up 70-80% of cases (CDC, 2020). Meanwhile, the Dyskinetic type and Ataxic type are less commonly found, accounting for 10-20% and 5-10% of cases, respectively (CDC, 2020). However, a combination of the three types sometimes occur and this is also called the mixed type (CDC, 2020). The focus of this study is Spastic CP (SCP) as it has a higher prevalence, despite the existence of other types of CP.

The estimated prevalence of CP worldwide is 4 children per 1000 live births (CDC, 2022) and that of Sub-Saharan Africa is 1 out of 323 live births (Adomako, 2017). Over the years, studies have shown that the prevalence of CP in low-and middle-income countries (LMIC) was increasing, with estimates of 3.4 per 1000 births, while that of high-income countries (HIC) was declining, with an estimate of 1.6 per 1000 births (Mc Lyntre et al.,2022; Sellier et al., 2015; Van Naarden Braun et al., 2016). According to Cerebral Palsy Africa (CPA), Ghana has a high prevalence of cerebral palsy, affecting 1 child per 300 live births (Kyeremateng et al., 2019; Tandoh, 2016).

In 2014, Donald and his colleagues investigated the risk factors that led to the high prevalence of CP in Africa. Findings revealed poor health systems as a main contributing factor to the considerably high rate of CP in Africa as compared to Western and European countries (Donald et al., 2014). In a later study conducted in Ghana, risk factors such as kinecticurus, birth asphyxia, neonatal infections, and poor maternal services were identified as the common causes of CP (Adomako, 2017). Additionally, literature reported that antenatal health care offered to expectant mothers in Ghana lacked comprehensive screening and early detection of risk factors associated with CP (Adomako, 2017; Menyah et al., 2020).

According to Karim et al., (2021) early diagnosis is important in improving the motor outcomes of CP. However, health professionals in Ghana do not readily have the diagnostic tools required for the proper screening and diagnosis of children with CP (Oguntade et al., 2022; Donald et al., 2014). The delay in diagnosis creates a challenge for caregivers due to the complexity of the disorder (Alshehri & Bach, 2014).

CP is a heterogeneous disorder, which requires strategic goal-setting involving the caregiver and all relevant team members in the rehabilitation team (Bartlett et al., 2018). Primary caregivers of children living with CP often decide the nature and direction of care their children receive (Chiluba & Moyo, 2017). Furthermore, caring for a child with CP is difficult since it affects the physical and psychological well-being of the caregiver (Raina et al., 2004). Raina et al. (2004) suggested that the management of CP is more effective if it is designed in such a way that it meets the needs of both the child with CP and caregivers. The caregiver's well-being and level of satisfaction can have an impact on their attendance to therapy appointments and rehabilitation outcomes (Foto et al., 2021). Therefore, the most effective management of meeting both the needs of the caregiver and child is important when considering a treatment model.

Over the years, therapists and researchers have designed different treatment models to manage the complex problems of children with CP (Karr et al., 2020; Khasnabis et al., 2010; Trani et al., 2021). These models include community-based rehabilitation and outpatient hospital-based treatment, which can be designed to treat children with CP individually or within a group setting (Abdel-Hamid, 2016; Dambi & Jelsma, 2014; Karr et al., 2020; Ödman, 2007; Zuurmond et al., 2018).

It is suggested that children with CP should be treated individually, as each child has a unique set of functional challenges that would respond best to individualized goals (Abdel-Hamid, 2016). In addition, Franki et al., 2014 stated that an individually defined targeted therapy approach is effective in functional goal attainment. In contrast, some studies reported that group therapy models are better suited to improving the functional ability of children with CP (Prest et al., 2022). In 2006, Mahmud found that the group therapy treatment model led to an improvement in functional activities amongst CP children, which included rolling prone to supine, bridging, four-point kneeling, squatting, half kneeling, standing and walking (Mahmud, 2006). Additionally, group therapy also provided the caregivers with an opportunity to interact and offer support to each other (Zuurmond et al., 2018).

In Ghana, the hospital-based treatment model is used for the treatment of children with CP. In some hospitals, the individualized model is used, whereby CP children are treated individually by a therapist who tailors the treatment specifically to suit their needs. While at another hospital, children with CP are treated in small groups. The groups usually consist of three children and one designated therapist. These children are grouped according to similar functional challenges and the therapist guides their treatment plan with the assistance of the caregivers.

1.2 Problem Statement

Ghana has substantial gaps in the delivery of healthcare services due to an inadequate patient-to therapist-ratio (Zuurmond et al., 2018). In 2021, World Physiotherapy stated that Ghana had approximately 0.07 practising physiotherapists per 10,000 population (World Physiotherapy, 2021). Currently, Ghana has an estimated population of 30.8 million people (Ghana Statistical Service, 2021), which implies that in a country with an estimated prevalence of one child born with CP per 300 births (Kyeremateng et al., 2019), there are many children with CP reporting to the hospitals for treatment (Zuurmond et al., 2018).

In addition, existing literature on CP in Ghana predominately focuses on risk factors, malnutrition, and the experiences and perceptions of the primary caregivers (Adei-Atiemo et al., 2015; Polack et al., 2018; Nyante and Carpenter, 2019; Fonzi et al., 2021; Kyeremateng et al., 2019). To date, there is a lack of knowledge and research on the management of CP in children and the improvement in gross motor function. Furthermore, by focusing on improving the management of CP in children, the burden of care amongst caregivers will be reduced, while enhancing the quality of life of the caregiver (Chiluba & Moyo, 2017). This is because the quality of life of the caregivers has an indirect effect on the children (Chiluba & Moyo, 2017; Schor, 2003).

Physiotherapists play a crucial role in the process of CP rehabilitation by facilitating movement to improve muscle tone and function (Balci, 2016). Studies have suggested physiotherapy interventions such as bobath, goal-oriented and family-centred therapy as treatment options in cerebral palsy management (Balci, 2016; Bamm & Rosenbaum, 2008; Bartlett et al., 2018; Tekin et al., 2018; Zanon et al., 2019). There is generally limited data available on the effectiveness of physical therapy interventions for children with CP (Anttila et al., 2008; Das & Ganesh, 2019). Despite the lack of available data, major advances have been made to enhance functional outcomes in the treatment of children wit CP, by adapting models such as

IPTM or GPTM (Abdel-Hamid, 2016; Franki et al., 2014; Thomas et al., 2014, 2016; Zuurmond et al., 2018). To our knowledge, the quantitative outcomes of these treatment models on the function children with CP and its effect on the respective caregivers have not yet been estabalished. Therefore, the study was aimed to investigate most feasible treatment model (individualized or grouped) for children with CP in Ghana.

1.3 Justification and Significance

There are two facilities in Ghana, that offer IPTM and GPTM, however, the outcomes of either of these treatment models in children with CP and their caregivers have never been compared. Due to children with spastic CP (SCP) being the most common type of CP worldwide, comparing the outcomes of treatment models in children with CP in Ghana will highlight the effects of physiotherapy treatment models on the function of children with SCP (Bearden et al., 2016; Chaudhary et al., 2022; Chen et al., 2021; Kamate & Detroja, 2022; Kundu et al., 2020). Additionally, exploring the effect of treatment models on the child's function and the caregiver will assist therapists in choosing the right model based on their setting. This may also serve as an evidence-based guide for facilities that have limited staff or a high rate of CP attendance while identifying which treatment model is the most applicable to the respective setting. This would ultimately provide an invaluable resource to aid in decision-making when it comes to the treatment of Children's CP to ensure that the best care is given to these patients, no matter the setting. Also, it could potentially lead to better long-term outcomes for children with CP and their caregivers. Furthermore, it can be used as an educational tool for students and physiotherapy professionals in the field, while also assisting policymakers in the health sector to make informed decisions when allocating resources and funding for CP treatment.

1.4 Aim and Objectives

The study aims to compare the outcomes of the group physiotherapy treatment model and individual physiotherapy treatment model for children with SCP**.** This will be achieved through the following objectives;

1. Describing the demographic data of the children with spastic CP and caregivers
2. Comparing the baseline outcomes between models in children with spastic CP with regard to:

- The gross motor function and manual ability using GMFM-88, GMFCS E&R, MACS/mini-MACS.
- The sores of the health-related quality of life (HRQoL) of the caregivers using the Caregiver version of HRQoL (EQ-5D-3L), the burden of care using the MCSI and caregiver satisfaction with the model of therapy their child is receiving using MRPS.

3. Comparing the difference in the outcome of the GPTM versus the IPTM, after three months of intervention with regards to:

- The gross motor function and manual ability using GMFM-88, GMFCS E&R, MACS/mini-MACS).
- The scores of the health-related quality (HRQoL) of the caregivers using EQ-5D-3L, the burden of care using the MCSI and caregiver satisfaction with the model of therapy their child is receiving using MPRS.

4. Compare the differences within treatment models for both functional (using the GMFM-88, GMFCS E&R, MACS/mini-MACS) and caregiver outcomes (using the Caregiver version of HRQoL (EQ-5D-3L), the burden of care using the MCSI and caregiver satisfaction with the model of therapy their child is receiving using MRPS).
5. Describe the caregiver's attendance to physiotherapy treatment in the individual versus group physiotherapy treatment model.

1.5 Research settings

The research was conducted at two different teaching hospitals in Ghana, referred to as the Korle-bu Teaching Hospital, located in an urban area and the Ho Teaching Hospital, located in a semi-rural area. The travel distance between the two hospitals is 168.9km. It takes an average travel time of 13.55km per hour for the participants to travel from their homes to the Korle-bu Teaching Hospital, while it takes

28.59km per hour to travel to the Ho Teaching Hospital. The study sites were the paediatric outpatient units of physiotherapy departments at each hospital. The pediatric unit at Korle-bu Teaching Hospital was managed by a team consisting of three physiotherapists and three physiotherapy assistants, while Ho Teaching Hospital had only three physiotherapists. The full details can be found in Appendix 28 and 29: Report from Physiotherapists in charge of the pediatric unit of Korle-bu and Ho Teaching Hospital.

Korle-bu Teaching Hospital is a major referral hospital in the capital city of Accra, Ghana, which receives patients from various regions nationwide. Children with CP, including SCP, are treated at the physiotherapy unit by qualified therapists, using IPTM which is in the form of one-on-one physiotherapy treatment sessions. First assessments are done individually and the child's goals are set with the involvement of the caregivers. Each physiotherapy session is approximately one hour, with patients attended to on a weekly basis. Treatment sessions are aimed at addressing the individual needs of the child and often include the caregivers, as they are educated on the condition and taught home exercises. The children are discharged from the physiotherapy unit when the therapist can confirm that the child has attained his/her highest functional level. Every child is reviewed after each visit and the average number of patients seen by a therapist per day is four. The full details can be found in Appendix 29: Report from Physiotherapist in charge of the pediatric unit at Korle-bu.

Ho Teaching Hospital is also a main referral hospital for the Eastern corridor of Ghana, located in Ho, Ghana. It receives patients from the Ho municipality, Volta, Eastern, and Oti regions of Ghana. Additionally, some patients travel from Togo, Benin, and Nigeria to seek medical treatment from the hospital. Children with CP are attended to at the physiotherapy department and are treated using the GPTM, as this is standard practice for the hospital. The physiotherapy group sessions are conducted in a spacious room with one therapist leading each group of three children, teaching the caregiver how to manage their child and to perform specific exercises. Physiotherapy group sessions last for an hour and children are seen once a week. Caregivers are given a thorough explanation of the condition and taught how to manage their children at home. The average patient-to-therapist ratio is 6:1 a day, therefore each therapist conducts an average of two group sessions per day (see Appendix 28: for details on the report from the therapist in charge of the pediatric physiotherapy unit of the Ho Teaching Hospital). Following their initial assessment, children exhibiting comparable clinical presentations and characteristics are grouped in sets of three, along with their respective caregivers. The children are grouped as follows; Group one includes children with CP who have not yet achieved neck and trunk control; Group two includes, those that have neck control but little trunk control and need to be progressed to sitting; Group three includes, children who have to be progressed from sitting to standing; and group four includes, children that need to be taught how to walk. Once a child has completed eight sessions of treatment, the physiotherapist conducts an assessment to evaluate the progress of the child. Caregivers in their various groups are given scheduled appointments that suit the members of the group. Individual assessments and reviews to establish if the child should stay or progress to the next group. The individual assessment is based on whether the goals have been achieved or not, and the caregiver is informed. Children are not discharged until they reach their highest functional level.

Chapter 2: Literature Review

2.1 Introduction

This chapter thoroughly examines cerebral palsy (CP), covering its definition, sub-types, prevalence worldwide and specifically in Ghana as well as its causes and diagnosis within the Ghanaian context. Additionally, we will delve into the treatment options available, the psycho-social impact of caring for a child with CP, and the benefits and drawbacks of both group and individual treatment approaches. Literature was sourced from the following databases; PubMed, Google Scholar, PEDro, Science Direct, Semantic Scholar, EMBASE and Scopus.

2.2 Definition and overview of cerebral palsy

Cerebral Palsy (CP) is defined as "a group of neurological disorders that affect the child's ability to move and maintain balance and posture" (NCBDDD and CDC, 2020). The symptoms of CP differ among children and are influenced by the location and extent of brain injury (CDC, 2022). The National Institute of Neurological Disorders and Stroke (NINDS) has compiled a list of common symptoms that are typically associated with cerebral palsy (CP). These include changes in muscle tone, difficulty with balance and coordination, overactive reflexes, excessive drooling or difficulty swallowing, joint stiffness, variations in muscle tone, and a scissored gait (NINDS, 2019). Additionally, a study found that attendance at maternal healthcare was insufficient for pregnant women and this was associated with adverse maternal and fetal outcomes, including stillbirths (Sánchez et al., 2022). In an attempt to curb the maternal mortality and health challenges that newborn babies face, the World Health Organisation (WHO) updated its recommendations from a minimum of four antenatal care appointments to eight (Sánchez et al., 2022; UNICEF, 2022). However, some countries in sub-Saharan Africa and some parts of Asia do not receive the minimum of four antenatal visits (Dickson et al., 2022; UNICEF, 2022). Globally only 66% of pregnant women receive the minimum antenatal sessions from skilled healthcare professionals yet, maternal health problems remain a concern (UNICEF, 2022). The Ghana Demographic and Health Survey (GDHS) conducted in 2014 by the Ghana Statistical Service (GSS) an agency of the Ghana Health Service showed that 97% of pregnant women received antenatal care from a skilled health service provider before their delivery. They also revealed that 87% of the women attended more than four antenatal care visits and mothers in the urban centers were more likely to receive antenatal care from skilled healthcare providers (GSS et al., 2014). The narrative is different for high-income European countries such as Germany, Finland, Sweden and Norway, where the proportion of late antenatal care attendance is low (Goncalves et al., 2022; Sánchez et al., 2022).

Manyeh et al., (2020) reported that late antenatal attendance initiation can lead to late detection and diagnosis of birth-related complications, which may result in devastating outcomes for both the newborn baby and mother. Some of these complications may become a predisposing risk factor for the development of CP (CDC, 2020; MacLennan et al., 2015). Antenatal care offered to expectant mothers in Ghana is not exhaustive in screening and early detection of risk factors associated with CP. Adomako reported that antenatal screening in Ghana is often done late or delayed, in addition to the mother's medical history being incomprehensive (Adomako, 2017).

Therefore, continuous antenatal care visits create an avenue for communication with healthcare providers. It creates an opportunity for early screening and diagnosis of possible diseases, which will assist in the prevention of possible health-related complications while aiding health promotion (Tunçalp et al., 2017). Numerous studies confirm that early diagnosis of CP and interventions assist in reducing the severe consequences of a future disability (Novak et al., 2017; Te Velde et al., 2019). Managing all aspects of the child's unique CP diagnosis is a challenge due to the complexity of the disorder and most CP caregivers are not equipped with the knowledge needed during the early stages (Alshehri and Bach, 2014; Fonzi et al., 2021).

2.3 Spastic cerebral palsy

There are three primary forms of CP, the most prevalent is spastic CP (SCP), caused by damage to the pre-motor cortex of the cerebral hemispheres and affects 70–80% of children with the condition. Ataxic CP (5–10%) and dyskinetic CP (10–20%) are other types caused by damage to the cerebellum or basal ganglia, respectively (CDC, 2022). The term "mixed-type CP" refers to a condition that combines the three categories of CP (Patel et al., 2020; Paul et al., 2022). Cans, 2000 gave an elaborate explanation that each type of CP has a unique set of characteristics and symptoms, as seen in Table 1. This assists healthcare professionals in making an effective CP diagnosis.

Table 2. 1: The types of CP and their respective characteristics, affected brain regions and diagnosis by Cans, 2000.

Cerebral palsy type	Characteristics	Brain region	Diagnosis	
Spastic cerebral palsy	Abnormal pattern of posture and/or movement, Increased tone (not necessarily constant)	Bilateral (both hemispheres of the cerebrum involved)	This type is diagnosed if limbs on both sides of the body are involved. For example, Diplegic and Quadriplegic type.	
	Pathological reflexes (increased reflexes: hyperreflexia and/or pyramidal signs e.g., Babinski response).	Unilateral (one hemisphere of the cerebrum involved)	This type is diagnosed if limbs on one side of the body are involved. Example Hemiplegic or monoplegic.	
Ataxic cerebral palsy	Abnormal pattern of posture and/or movement, Loss of orderly muscular coordination so that movements are performed with abnormal force, rhythm, and accuracy.	Cerebellum is involved		
Dyskinetic cerebral palsy	Varying muscle tone is noted globally, with resting hypotonia of muscles and hypertonia on initiation of movement, Involuntary, uncontrolled, recurring rhythmic movements and occasionally stereotyped movement patterns. Dyskinetic CP may be either dystonic (characterised by slow rhythmic recurring movements or choreoathetosis (characterised by jerky, rapid, recurring movement):	Injury is mainly at the basal ganglia	Dystonic CP	Hypokinesia (reduced activity, that is, stiff movement) - Hypertonia (tone usually increased
			Choreoathetotic CP	-Hyperkinesia (increased activity, that is stormy movement) -Hypotonia (tone usually decreased)

2.4 Cerebral palsy in Ghana

A recent report by the Centers for Disease Control and Prevention (CDC) reveals that cerebral palsy (CP) affects one to four children in every 1,000 live births worldwide (Galea et al., 2019; McGuire et al., 2019; NCBDDD and CDC, 2020). It is worth highlighting that in Ghana, the probability of being diagnosed with cerebral palsy (CP) stands at 1 in 300 births (Adomako, 2017; Kyeremateng et al., 2019; Tandoh, 2016). Similarly, in Sub-Saharan Africa, the incidence rate of CP diagnosis is estimated to be 1 in 323 children (Kyeremateng et al., 2019). These statistics serve to emphasize the high prevalence of CP in this region, underscoring the need for greater awareness and resources to support individuals affected by the condition. Several studies have reported that the prevalence of CP in high-income countries (HIC) countries has decreased, in contrast to African countries (Sellier et al., 2015; Van Naarden Braun et al., 2016; CDC, 2022).

Several risk factors were identified as contributing factors to the high prevalence of CP in Africa (Donald et al., 2014). These risk factors include poor health systems, shortage of qualified health professionals in the management of CP and gaps in research information regarding CP in Africa (Donald et al., 2014). In addition, a lack of resources to support families that cannot afford proper health care from private health facilities which have specialists readily available and a lack of structured screening protocols for children with developmental disabilities (Karumuna and Mgone, 1990; Ogunlesi et al., 2010; Adei-Atiemo et al., 2015). In most rural areas, proper diagnostic tools are not readily available and many families of children with CP face stigmatization by the community due to superstitious beliefs (Nyanteh & Carpenter, 2019).

2.5 Aetiology and diagnosis of cerebral palsy in Ghana

The most commonly reported aetiologies for CP in African populations are birth asphyxia, kernicterus; and neonatal infections, with prematurity or low birth weight (Tallawy et al., 2010; Karumuna & Mgone, 1990; Ogunlesi et al., 2010). Research conducted at the Korle-bu Teaching Hospital revealed that in addition to birth asphyxia, prematurity or low birth weight; severe neonatal hyperbilirubinemia, neonatal seizures, and neonatal sepsis are also major risk factors for CP (Adei-Atiemo et al., 2015). Studies have revealed that most of the aetiologies identified in Africa were potentially preventable (Couper, 2016; Karumuna & Mgone, 1990; Ogunlesi et al., 2010; Tallawy et al., 2010).

The diagnosis of CP is generally based on a combination of three aspects which are, neurological, physical and medical examinations (Donald et al., 2014). In clinical practice neuroimaging or testing methods such as Computed Tomography (CT) scans, Magnetic Resonance Imaging (MRI), genetic and metabolic testing exist to diagnose CP. However, CP diagnosis and detection is typically based on observations of the muscle tone, persistence of primitive reflexes, evaluation of posture and the attainment of motor milestones (O'Shea, 2008; Martin Staudt, 2013; Te Velde et al., 2019). In addition to these symptoms the presence of other associated symptoms such as epilepsy, swallowing difficulty, gastrointestinal problems, cognitive deficits; and hearing and speech impairment also confirms the diagnosis (Brown et al., 2011; Pruitt & Tsai, 2009). In cases where a CP child presents with epileptic seizures, an electroencephalogram (EEG) is used to check the electrical activity of the brain (Stafstrom and Carmant, 2015).

Population-based studies of registries in high-income countries have shown that the diagnosis of CP is confirmed by the examination of medical records or history obtained from the mother during pregnancy, at birth or after birth (Novak et al., 2017; O'Shea, 2008). These examinations are not done once off and instead, are repeated from time to time, especially when the infant is in their early months or years of life (Te Velde et al., 2019). Clinicians confirm CP in infants under five months with a cranial ultrasound. An MRI is ideally only done after the child has reached two years, as the brain is then more developed and the presence of the clinical features of movement disorder is more obvious (Staudt, 2013). Studies have also shown that by two years old, establishing the diagnosis of a CP is more definite in comparison to the early years of life (Novak et al., 2017; O'Shea, 2008; Te Velde et al., 2019).

Health professionals in Africa do not readily have the diagnostic tools required for the proper screening and diagnosis of children with CP (Donald et al., 2014). As a result, early diagnosis and treatment of CP is often delayed or goes unnoticed. Te Velde and his colleagues stated that in low- and middle-income countries, diagnosis of CP is often done by the age of five years in comparison to a diagnosis done between 12 to 24 months of age in high-income countries (Te Velde et al., 2019). They further explained that, two major barriers to the early diagnosis of CP, have been identified which include the lack of definitive biomarkers in infants with CP, meaning some infants with CP not yet showing obvious activity limitations may have fit the definition of CP and the heterogeneity of the disorder meaning there were differences in the classifications and topography (Te Velde et al., 2019).

2.6 Management of cerebral palsy

CP can be managed medically, surgically and through rehabilitation (Panteliadis, 2018). Management of CP can be approached using a multi-disciplinary team as there are numerous systems that are affected by the disorder. These multi-disciplinary teams usually consists of a neurologist, paediatrician, psychologist, social worker, and physiotherapists, speech and occupational therapist, in addition to family involvement (Abdel-Hamid, 2016).

2.6.1 Medical treatment

Medications that can lessen muscle tightness might be used to improve functional abilities, treat pain and manage complications related to spasticity or other cerebral palsy symptoms (Shamsoddini et al., 2014).

Muscle or nerve injections

This method is used to treat tightening of a specific muscle. Injections of botulinum toxin A (Botox, Dysport) can be used (Shamsoddini et al., 2014). The physiology is that Botulinum toxin type A impairs the release of acetylcholine at the neuromuscular junction which reduces the tone in the muscles (Multani et al., 2019). Thereby interrupting the mechanism of muscle contraction rendering the muscle temporarily weaker (Kinnett, 2004; Shamsoddini et al., 2014; Yang et al., 2003). Muscles that are commonly treated with this type of injection are the gastrocnemius-soleus complex, hamstrings, hip adductors and flexor synergy muscles of the upper extremity(Jefferson, 2004). Studies on the use of botulinum toxin show reduced lower limb muscle spasticity (Boyd and Hays, 2001; Love et al., 2010; Meyer-Heim et al., 2009).

Phenol muscular injections can be given to induce chemical denervation for treating local spasticity (Delgado et al., 2010).

Oral Muscle Relaxants

Drugs such as diazepam (Valium), dantrolene (Dantrium), baclofen (Gablofen, Lioresal) and tizanidine (Zanaflex) are often used to relax muscles (Delgado et al., 2010).

2.6.2 Surgical procedures

Surgery may be needed to lessen muscle tightness or correct bone abnormalities caused by spasticity. These treatments include orthopaedic surgery, selective dorsal rhizotomy.

Orthopaedic surgery.

Tight joints and contracture formations are complications of cerebral palsy therefore Child surgery may be needed to place their arms, hips or legs in their correct positions. Surgical procedures can also be done on muscles and tendons to lengthen the structures that are shortened by contractures. These corrections can lessen pain and improve mobility. The procedures can also make it easier to use a walker, braces or crutches (Shore et al., 2010).

Cutting nerve fibres (selective dorsal rhizotomy).

In some severe cases, when other treatments haven't helped, surgeons might cut the nerves serving the spastic muscles in a procedure called selective dorsal rhizotomy. This relaxes the muscle and reduces pain, but can cause numbness. Research has shown that it is very effective in reducing muscle spasticity and improving gait kinematics (Grunt et al., 2011; Novak et al., 2013).

Other surgical procedures

Other surgeries done for children with CP may include;

Fundoplication (including Nissen and laparoscopic; gastric plication): surgical procedure to strengthen the barrier to acid reflux, e.g. by wrapping the fundus around the oesophagus (Gantasala et al., 2013; Sanchez et al., 2016). This method addresses the comorbidity of oesophageal acid reflux that occurs in CP.

Gastrostomy: surgical placement of a non-oral feeding tube to prevent or reverse growth failure, or prevent aspiration pneumonia which is another comorbidity in CP, e.g. Percutaneous Endoscopic Gastrostomy (PEG), jejunostomy (Gantasala et al., 2013).

Hand surgery: surgery to improve hand function and alignment (Pontén et al., 2019).

Hip surgery: orthopaedic surgery to improve musculoskeletal alignment of the hip (Houdek et al., 2017)

2.6.3 Rehabilitation therapies

Rehabilitation of children with cerebral palsy is mainly directed towards maintaining optimal physical, sensory, intellectual, psychological, and social function (Burton, 2015; Reddihough et al., 2013). It includes providing the tools and the right environment to gain and maintain independence. Brain plasticity also known as Neuroplasticity is an important concept in rehabilitation since it helps in understanding the pathophysiology and treatment of CP. It has also directed research into the functional recovery of children with CP (Ungerleider et al., 2002). This generates the view that Neural plasticity is an inherent characteristic of the brain to start learning and relearning a lifelong skill through repetitive exercises (Ballantyne et al., 2008; Kolb et al., 2003).

Literature states that intensive rehabilitation improves motor function in children with CP and this can be achieved through repetitive, goal-directed movements that are associated with sensory feedback for the reorganization of the neuronal pathways and motor development after brain injuries (Sakzewski et al., 2009).

In general, techniques used in CP rehabilitation can be classified as approaches without using any equipment and approaches with using equipment (Balci, 2016). In the rehabilitation of CP, there have been several major therapeutic practices during past years, including the Bobath concept, Vojta therapy, Constraint-induced movement therapy, Goal attainment therapy Conductive education, sensory integration and many more; these models of treatment have been adopted as conventional approaches to treatment (Balci, 2016; Novak et al., 2013). However, Novak and colleagiues identified Bobath, Vojta, and sensory integration therapy lack substantial evidence at a lower level to support their efficacy in treating children with cerebral palsy. As a result, these approaches are not recommended for standard care (Novak et al., 2013).

A variety of therapies exist in treating children with CP, and also play a significant role in the rehabilitation of the children affected by this condition.

2.6.4 Physical therapy.

Physical therapy rehabilitation involves the use of physical modalities (such as exercise, massage, ice, heat, electrical stimulation, water/hydrotherapy, acupuncture) in treating illness. For example, physiotherapists perform several range of motion exercises which often emphasize muscle strengthening and balance training, along with muscle symmetry in cerebral palsy rehabilitation (Damiano, 2009). Early interventions with physical therapy (PT) or physiotherapy are recommended due to the functional deficit found in Cerebral Palsy (Øberg et al., 2012; Ziviani et al., 2010).

Conventional therapy physiotherapy rehabilitation has gained popularity over the years because it included evidence-based treatment methods that have been researched and proven to be beneficial in rehabilitating children with CP (Chen et al., 2013).

For the first one to two years after birth, both physical and occupational therapists provide support with issues such as head and trunk control, rolling, and grasping which are the core neuro-developmental milestones that are needed to be achieved by the normal child (Farley et al., 2003).

Øberg et al., 2012 in their study deduced that physiotherapy and early education promote acquisition of milestones, through group or individual stimulus in children with CP.

Studies by Das and Ganesh on the evidence-based approach to physical therapy in Cerebral Palsy revealed that some of the interventions used by physical therapists needed more evidence since there was little research performed in those areas (Das and Ganesh, 2019). Furthermore, in their review, most of the studies had limitations (Ziviani et al., 2010) were due to the heterogeneity of the disorder of cerebral palsy but they recommended that future research is required to find best ways to improve functional outcomes of CP treatment. Similarly, Bartlett et al. (2018) in their review also identified that randomised controlled trials and systematic reviews alone did not help in providing therapists with concrete evidence-based practice since most of the researchers were confronted with limitations in explaining certain trends in their outcomes therefore they rather recommended the use of prospective cohort studies in analysing the effectiveness of physiotherapy interventions in Cerebral palsy management due to the heterogeneity of the disorder.

Lastly, braces or splints are also prescribed by the physical therapist for the child to help with improving and maintaining functional range of motion of major joints. This leads to improved efficient movement patterns, such as improved walking, and ease in performing transitions between starting positions such as sit to stand or supine to sitting (Autti-Rämö et al., 2006; Blackmore et al., 2007).

2.6.5 Occupational therapy.

Occupational therapists (OT) work hand in hand with Physiotherapists to help the child gain independence in daily activities and routines in the home, the school and the community (Smith et al., 2000). Studies have shown that Occupational therapy intervention resulted in improved hand use through Constrained Induced Movement Therapy (CIMT), goal-directed training, strength training and functional hand splints (Balci, 2016). OT intervention also produced improved joint integrity management through casting and pro-longed passive immobilisation using splints (Autti-Rämö et al., 2006).

Occupational therapists also recommend adaptive equipment for the child affected with cerebral palsy and these include walkers, quadrupedal canes, seating systems or electric wheelchairs(Autti-Rämö et al., 2006; Blackmore et al., 2007).

2.6.6 Speech and language therapy.

Speech-language pathologists can help improve the child's ability to speak clearly or to communicate using sign language. They can also teach the use of communication devices, such as a computer and voice synthesizer if communication is difficult. Researchers have developed alternative and augmentative communication. These technologies are alternatives to verbal speech. For example communication boards, speech generating devices (Branson and Demchak, 2009; Pennington et al., 2004). The results were improved general communication skills and improved communication skills of preschool children; Millar et al., 2006). Dysphagia management is done by promoting safe swallowing by changing food textures, sitting position, oral motor skills and using oral appliances and equipment. The results yielded improved safety of swallowing through thickened fluids and upright position resulting in less aspiration (Snider et al., 2011).

Lastly, it is evident that speech therapy enhances oral motor treatments and also include sensory stimulation to lips, jaw, tongue, soft palate, larynx, and respiratory muscles to influence the oropharyngeal mechanism (Snider et al., 2011; Wilcox and Potvin, 2009).

2.6.7 Behaviour therapy

Research showed that interventions of behavioural therapists produced positive behaviour support, behavioural interventions, and positive parenting (Roberts et al., 2006). Research has been done to show that the preceding reports from behavioural interventions produced also improved parenting skills (Roberts et al., 2006; Sanders et al., 2009; Whittingham et al., 2011).

2.6.8 Rehabilitation approaches without using any equipment

Conventional therapy

This form of approach in physiotherapy rehabilitation involves standardized practices that have been researched, tested and approved by the medical community as acceptable forms of treatment for children with cerebral palsy (Chen et al., 2013; Damiano, 2009). These include strengthening exercises, passive stretches, massage and so on (Mahmud, 2006). The strengthening exercises include the use of functional exercises which are graded and modified with the aim of improving motor activities like neck /trunk control, rolling, sitting, standing, walking and so on (Damiano, 2009; Dodd et al., 2002; Mockford and Caulton, 2008).

Bobath concept

In the 1940's Dr Karel Bobath and Berta Bobath developed the Bobath concept also known as neurodevelopmental treatment (NDT). The concept was developed from observations of how normal tone affected the child's ability to perform functional ability (Mayston, 2004). It also involves special handling techniques of positioning to normalise the muscle tone to facilitate movement patterns perform daily tasks (Barber, 2008). It uses a system of motor control to achieve Neuroplasticity as the primary mechanism for neurological recovery (Zanon et al., 2019). According to Bobath, the concept of NDT aims to influence muscle tone, influence primitive reflexes, and facilitate functional movement patterns (Barber, 2008).

Research on the effectiveness of Neuro-Developmental Treatment (NDT) showed that the NDT approach was effective in improving the functional control and independence in diplegic and hemiplegic CP child after 8 weeks of NDT treatment (Tekin et al., 2018).

Zanon et al. (2019) in their systematic review compared bobath treatment with other conventional physiotherapy methods. The major limitation identified from their study was, CP rehabilitation was not routinely practiced by many. There were few studies supporting Bobath treatment techniques effectiveness in clinical practice, despite its popularity.

Goal attainment therapies

This approach has a primary aim to facilitate the child's ability to participate in his daily activities for example, in terms of dressing, how to dress and undress (Bamm and Rosenbaum, 2008). Goals are designed to meet the achievement of activity and the choice of goals for therapy is dependent on many determinants like the child's likings and the family's preferences, the society and environment in which the family lives, and the child's degree of disability (Nijhuis et al., 2008).

Over the years, this approach has gained popularity and is now known as the 'task-oriented' approach and is built on theories of motor control (Darrah et al., 2008). The development and learning of new skills happen as an interaction between the child, the task to be performed, and the particular environment in which the activity takes place (Valvano, 2010).

The goals are graded in steps to provide an individualized plan for the child to learn the specific activity and reach the ultimate goal set (Hurn et al., 2006).

Generally there is limited and insufficient research on the effectiveness of this type of approach (Papavasiliou, 2009). Franki and colleagues in a randomized single-blind cross-over design evaluating the effectiveness of an individually defined, targeted physical therapy approach in treatment of children with cerebral palsy, showed that functional goal attainment was high in ambulant children with bilateral spastic CP (Franki et al., 2014).

Strength training programs

In the past, studies suggested that strength training programmes were not recommended for treating children with CP as it was perceived to increase spasticity (Özal et al., 2016). However, more recent studies have found that strength training programmes had no effect on spasticity during and after the training (Abal del Blanco and Taboada-Iglesias, 2021; Morton et al., 2005; Scholtes et al., 2010).

Other studies also confirmed that strength training programmes did not have any negative effects on the muscles in children and adolescents with spastic diplegic and hemiplegic (Dodd et al., 2002; Engsberg et al., 2006; Verschuren et al., 2016). Furthermore, resistance training has been detected to have observable benefits in strength among children, adolescents, and adults with CP (Verschuren et al., 2016).

Conductive Education

Conductive education (CE) combines educational and task-oriented approaches for children with CP. In this approach, a conductor who can also be the therapist leads the programme towards the achievement of activities of daily living like dressing (Myrhaug et al., 2018). Group work is an integral part of this approach and is a key motivating factor (Medveczky , 2006). Here, activities are presented through music and rhythmic speech (Myrhaug et al., 2017).

A study comparing individual PT or OT with CE showed that CE improved hand coordination functions and activities of daily living (Blank et al., 2008). Also, this approach emphasizes the attainment of functional independence and attaining goals rather than the quality of movement (Liptak, 2005; Papavasiliou, 2009). Similarly, research on the Effectiveness of Physiotherapy and Conductive Education Interventions in

Children with Cerebral Palsy concluded that there was limited evidence-based research on Conductive education (Anttila et al., 2008).

Sensory integration training

Sensory integration training (SIT) approach is used for children who are over-sensitive and under-sensitive. Over-sensitivity occurs when they have trouble in the ability to filter sensations at once and under-sensitivity occurs when the child is unable to process sensory messages quickly or efficiently or they seem to be disconnected from the environment (Barber, 2008). It normally involves the use of equipment such as big rolls and medicine balls, trampolines, and swinging hammocks to increase proprioceptive, vestibular and tactile experiences (Hosseini et al., 2015; Pavão and Rocha, 2017; Tramontano et al., 2017). In a research article to investigate the effect of sensory integration therapy on gross motor function in children with spastic diplegic CP, it was concluded that sensory integration training had a positive effect on their gross motor (Shamsoddini et al., 2009). The results showed significant improvement of gross motor function in the case group as compared to the control group in positions such as sitting, crawling and standing but no significant difference in the scores of gross motor function was seen inrollingandwalking positions (Shamsoddini et al., 2009).

Constraint-induced movement therapy (CIMT)

Constraint-induced movement therapy (CIMT) is a type of approach where movement is intentionally inhibited in the functional limb while the affected limb is allowed to perform specific tasks to achieve the goals of therapy (Deluca et al., 2016; Gillick et al., 2018; Novak et al., 2020).

A clinical trial by Chui and Ada (2016) showed that CIMT improved upper limb function significantly especially in children with hemiplegic CP (Chiu and Ada, 2016). In recent systematic reviews, CIMT had high quality evidence backing its efficacy in improving upper limb function in Cerebral Palsy (Chen et al., 2014; Myrhaug et al., 2014; Novak et al., 2020).

The Bimanual training

Bimanual training (BIT) provides bimanual training that focus on improving the coordination of both arms using structured tasks in bimanual play and functional activities with intensive practice (Gordon et al., 2011; Nemanich et al., 2019; Novak et al., 2020). This approach uses motor learning theories such as practice specificity and neuroplasticity (Novak et al., 2020). Practice specificity uses the principle of applying specific tasks and receiving feedback. Neuroplasticity is the ability of the brain to learn activities by repetition, increasing movement with complexity, motivation, and reward (Sakzewski et al., 2014). BIT also the recognises that increased functional independence in the child's environment requires the combined use of both hands (Bleyenheuft and Gordon, 2014). Furthermore, the BIT approach was designed in response to the limitations of CIMT and to address bimanual coordination while maintaining the positive aspects of intensive training of the impaired arm. BIT also focuses on improving the coordination of the two hands using structured task practice embedded in bimanual play and functional activities (Novak et al., 2020).

Family-centered models

Family-centred approach refers to the type of treatment where the family is involved in treatment (Bartlett et al., 2018). It includes the exchange of information between family members and the therapist. It encourages family responsiveness that focuses on the child-family strengths, not the deficits (Dunst and Trivette, 2009; Kang et al., 2014; King and Chiarello, 2014).

Evidence shows that this approach correlates with the physical/health benefits of the children and the psychosocial benefits of the mothers (King & Chiarello, 2014).

This approach is very beneficial in early intervention since it is at this stage that the therapists and family often collaborate in rehabilitation. Studies have endorsed this idea in early paediatric rehabilitation (Mohamadian et al., 2012; Novak et al., 2020). As described by Palisano and colleague, successful family-therapist collaborations involve listening, sharing, and learning with families while facilitating parent-centred decision-making (Palisano et al., 2012). These abilities are essential to delivering family-centred services, providing effective support, and building relationships (Almasri et al., 2012; Bartlett et al., 2018; Palisano et al., 2010).

Vojta therapy

This treatment utilizes the principle of developmental kinesiology or reflex locomotion involving the muscular system and central nervous system and its neural pathways (Gajewska et al., 2018). It involves fundamental stages such as reflex creeping, rolling and locomotion (Gajewska et al., 2018; Jung et al., 2017). Here, the therapist applies pressure to these defined zones on the body whilst positioned in a prone, supine or side-lying, where the stimulus leads to automatically and involuntarily complex movement (Gajewska et al., 2018).

Studies have shown that Vojta therapy has positive effect in improving the motor function in children with cerebral palsy (Hok et al., 2014; Jung et al., 2017; Lim & Kim, 2013). However, a systematic review by Das and Ganesh (2019) showed that this approach had limited evidence backing it for this heterogeneous population of CP and also that it was less commonly used by most therapists (Das & Ganesh, 2019).

Passive stretches and strengthening exercises

Contracture formation is one of the major complications seen in cerebral palsy treatment. Therefore, passive mobilisations and stretches protect the joint and reduce complications of contracture (Kalkman et al., 2020; Valadão et al., 2021; Wu et al., 2011; Coutinho et al., 2004).

Researchers have contributed to the widespread use of passive mobilisations in the treatment of cerebral palsy children and they have proven its effectiveness in treatment (Theis et al., 2013; Wu et al., 2011)

Furthermore an appraisal by Arpino et al. (2010) and Myrhaug et al. (2014) showed that there were improvements in function due to intensive strengthening exercises. Nonetheless, Scianni and colleagues revealed that strengthening exercises for children with CP had no significant improvement in function (Scianni et al., 2009).

Hydrotherapy

This approach used the properties of altered density and gravity, hydrostatic pressure, buoyancy, viscosity and thermodynamics to treat children with cerebral palsy (Blohm, 2011; Rogers et al., 2008; Roostaei et al., 2016).

Hydrotherapy or aquatic-based exercises are beneficial by promoting safe movement, improving muscle strength, promoting cardiovascular endurance, alleviating pain and tension at the joints, promoting the general relaxation of the child and functional activity training (Rogers et al., 2008).

Research to investigate the effect of aquatic and land-based training on the metabolic cost of walking and motor performance in children with cerebral palsy, the study showed that there was improved metabolic cost of walking (MCW) in children with spastic diplegic CP. Another study concluded that hydrotherapy was feasible with minimal adverse effects on the child (Roostaei et al., 2017).

2.6.9 Rehabilitation approaches with the use of equipment

Cardiorespiratory endurance training

In a review to find evidence based reasons for cardiovascular endurance training in CP concluded that, though the training may improve aerobic fitness there was limited research evidence (Gorter et al., 2009). Similar results were obtained by Rogers et al. (2008) in their study which revealed that aerobic training can improve physiological outcomes, but the influence of these changes may not be translated in activity and participation domains in children with CP.

Electrical stimulation (ES) or Functional Electrical Stimulation (FES) or Neuro Muscular Electrical Stimulation (NMES))

In this approach, electrical stimulation of a muscle through a skin electrode to induce passive muscle contractions for muscle strengthening and motor activation (Brinks et al., 2008; Wright et al., 2008).

Systematic reviews by researches have shown that functional electrical Stimulations have positive effect on gait outcomes (Franki et al., 2012; Kerr et al., 2004; Zhang et al., 2018) and hand function in the upper limbs. Wright et al. (2008) also in a similar study on the performance of electrical stimulation on gait or upper-limb function in children with CP. The results showed of that there is moderate evidence for electrical stimulation in improving muscle strength, range of motion, and function in children with CP.

Treadmill training

Children with CP have ambulatory deficits therefore the treadmill offers assistance and helps in improving balance and coordination (Jung et al., 2016) and builds strength of their lower limbs so they could walk earlier and more efficiently than those children who did not receive treadmill training (Olama, 2011). Recent systematic reviews on the use of treadmill gait training in cerebral palsy rehabilitation have shown positive outcomes (Jung et al., 2016; Laforme and Effgen, 2006; Provost et al., 2007).

Robot-assisted therapy (RAT)

The Robot-assisted therapy is a type of approach where muscle training is done with an assistive robotic device to enable the child perform specific limb movements within a limited time(Schuler et al., 2015; Duret et al., 2019; Meyer-Heim et al., 2009). It uses the principle of neuro plasticity to enable the child perform repetitive movement (Balci, 2016). It also enables the child to have other sensory feedback like visual and auditory feedback while performing the exercises that mimic activities of daily living (Fasoli et al., 2008; Gilliaux et al., 2015). Studies on the outcomes of robot- assisted therapy show positive outcomes in activities of daily living (Borggraefe et al., 2010; Meyer-Heim et al., 2009). A modern device recently developed for the locomotion training also called the Lokomat with a weight bearing system and a treadmill was proposed by Peri et al. (2015) to improve walking and physical fitness.

Orthotics (splints)

Orthotics are removable external devices designed to support weak or ineffective joints or muscles and they are highly recommended by many researchers in cerebral palsy management (Autti-Rämö et al., 2006; Blackmore et al., 2007; Effgen and McEwen, 2008). The most commonly used orthosis in Cerebral palsy management are the ankle-foot orthosis (AFO) (Eddison & Chockalingam, 2012; Jagadamma et al., 2015) . This device helps in maintaining a plantigrade foot and facilitate an upright standing posture while walking. The Ankle-foot Orthosis is indicated for children who are walking and have a three GMFCS levels 1-3. For Children who have not yet achieved ambulation or have GMFCS level 4 or 5, Ankle Foot Orthosis (AFO) may be used to prevent contractures (Lintanf et al., 2018). Although AFOs are widely prescribed, a systematic review found only weak evidence for their effectiveness (Morris, 2002).

For children with poor postural control, seating supports are helpful at mealtimes and for using a wheelchair (Farley et al., 2003; McDonald et al., 2015).

2.6.10 Grouped and individualized models of rehabilitation in the management of a child with cerebral palsy

Over the years, researchers have designed models of treatment to help both the caregivers and children with CP, namely IPTM and GPTM (Abdel-Hamid, 2016; Dambi & Jelsma, 2014; Karr et al., 2020; Pia Ödman, 2007; Zuurmond et al., 2018). It is important to note that there is a limited body of literature supporting the (IPTM), despite it being the most widely used treatment option for the management of physical therapy in CP childen in the various hospitals (Thomas et al., 2014). IPTM is a type of treatment model where children are treated on a one- on -one basis. Here, one therapist admisters treatment procedures with little or no involvement of the caregivers (Thomas et al., 2014). The group therapy model (GPTM) is a type of therapy in which one or more therapists work with several people at the same time or one therapist works with more than one child and caregiver in a group at the same time in order to achieve the desired results. It is based on the concept of assisting caregivers through social support (Thomas et al., 2014).

According to the guidelines provided by the National Institute for Health and Care Excellence (NICE), support groups, which include the psychological and emotional support given to the child and parents, carers or siblings were stated as part of their intervention (National Institute for Health and Care Excellence, 2017). There is evidence that social support may have a beneficial impact on the parents, which may result in an overall improved well-being (Palit & Chatterjee, 2006; Pousada et al., 2013). Caregivers of children with CP experience high levels of stress and depression, which are associated with the child's condition, poor prognosis, societal pressure, behavior and level of impairment (Prest et al., 2022). In addition, there are other factors such as reduced social support, vulnerability and self-confidence that contribute to the childs condition (Prest et al., 2022). It is important to develop targetred interventions which aim at improving the well-being of caregivers who are caring for children with CP in the community (Irwin et al., 2019). Therefore, health care professionals treating children with CP should pay particular attention to the well-being of the caregivers, and work with them to improve their experience and management of children with CP (Hayles et al., 2015; Kruijsen-Terpstra et al., 2016; Novak & Honan, 2019; Shevell et al., 2019).

Group pysiotherapy treatment model (GPTM)

The GPTM was initially adopted for psychotherapy but has since been adopted by physiotherapists to enhance CP rehabilitation, and also caters for the needs of the caregivers. The clinical significance of group therapy is in its effectiveness in rehabilitation and offering the therapist the ability to render concurrent treatment opportunity. This saves time, resources, and therapists energy expenditure (Deblinger et al., 2016; Prest et al., 2022; Ormont, 1981). The GPTM provides a cost-efficient method of treatment, as fewer trained professionals are required to provide treatment to a larger number of patients (Deblinger et al., 2016). This can be advantageous in facilities which have a low therapist to patient ratio. Treatment in a group setting allows therapists to be more flexible with their sessions. Additionally, the inclusion of multiple sessions throughout the day allows therapists to treat a larger volume of patients throughout the day, reducing the waiting time in high-volume areas (Deblinger et al., 2016). The GPTM also serves as a training opportunity for the caregivers. Caregivers gain knowledge and expertise from the therapists and learn from other caregivers who share the various strategies they have adopted in order to overcome the challenges in the management of CP children (Deblinger et al., 2016; Zuurmond et al., 2018). It is important to note that the GTM does have some limiitations which include the lack of privacy (Malhotra & Baker, 2022), lack of engagement (Higgins et al., 2022), patient limitations (Larsson et al., 2018), patients who complain and the responses of other members to conflict (Malcolm et al., 2016).

The individualized treatment model (IPTM)

Some studies suggest that the management of patients with CP must make used of the IPTM, based on the child's clinical presentation, which requires a multidisciplinary approach. Franki et al. (2014) evaulated the effectiveness of IPTM for CP, concluding that there was no significant change in the gross motor function of the child, however functional goal attainment was observed to be higher after individualized treatment in comparison to the group treatment programme. Individualized therapy offers patients the opportunity to have privacy, allowing therapists to spend more time with the patient (Novak et al., 2020). This also provides a more intense and a comprehensive level of interaction between the patient and therapist, while ensuring the treatment tailored to the individual (Malhotra & Chauhan, 2020; Bartlett et al., 2018). Additonally, individualized treatment contributes to the development of the childs awareness and to the development of a good therapist-caregiver alliance, provided a solid foundation for effective communication (Novak et al., 2020; Malhotra & Chauhan, 2020).

As with the GPTM, the IPTM also has some limitations (Karsberg et al., 2021). Firstly, due to the longer individual sessions, the patient waiting times are higher. Secondly, therapists may feel pressurized if appointments are not planned adequately. The IPTM system is therefore not suited for areas with a low therapist-to-patient ratio. According to the World Confederation of Physiotherapists (WCPT), Africa has the lowest physiotherapist to patient ratio worldwide (WCPT-Africa Region, 2020). Most countries in the African continent have less than 0.5 physiotherapists per 10,000 of the population, excluding South Africa (1.3), Morocco (0.8) and Namibia (0.6) (WCPT-Africa Region, 2020). This limited number of physiotherapists in the African region has led to the overwhelming burden on therapists in many developing counties in Africa (WCPT-Africa Region, 2020).

The IPTM is an expensive treatment model (Ryans et al., 2020). Patients who have individualized sessions with the therapist pay more than those who have group therapy sessions (Ryans et al., 2020). individualized sessions also offer no opportunity for peer interaction, which is a crucial component of caregiver social support. Researchers have reported that peer interactions and social support are important for caregivers in terms of improving their health-related quality of life, particularly in terms of anxiety (Bernabéu-Álvarez et al., 2020, 2022; Wynter et al., 2015). Lastly, there is a lack of motivation in the IPTM for caregivers which can affect their compliance to therapy sessions (Karsberg et al., 2021; Maclean et al., 2002).

2.7 The psychosocial impact of caring for a child with cerebral palsy

Having a child with CP impacts the relationships between members of families (Al-Gamal and Long, 2013). Nurturing a child with CP can become stressful if the caregiver does not receive sufficient support within the family (Sankombo & Sankombo, 2022). This can impact the relationships between spouses, parents, siblings and extended family members (Reichman et al., 2008). Schor (2003) stated that the health and well-being of children are undeniably linked to their caregivers' physical, emotional and social health, including social circumstances and child-nurturing practices. The rising incidence of behavioral issues among children with CP demonstrates the families' inability to cope with the increasing stresses and reveals their need for help (Foto et al., 2021). The wellbeing and level of satisfaction of the caregiver have a high probability of affecting the compliance with therapy appointments and rehabilitation outcomes (Foto et al., 2021). According to Nota et al. (2015), caregivers non-attendance to scheduled therapy sessions are due to a combination of psychosocial, economic, child-centered, and service-centered factors. Further, to improve caregiver attendance to scheduled therapy sessions, the authors suggest implementation of community outreach services, efficient rehabilitation service provision at hospitals and facilitation of income generating programs for caregivers (Nota et al., 2015).

A 2017 study, conducted in Kano state, Nigeria found that certain sociodemographic factors greatly influenced caregiver adherence to physiotherapy (Usman et al., 2017). These sociodemographic factors included the level of education, marital status, knowledge of CP and socio-economic status of the caregivers. Caregivers who were married, had a high level of education, with an adequate knowledge of the condition and were of higher socio-economic status had a higher adherence to therpy sessions (Usman et al., 2017). This suggests that there are factors that influence adherence to therapy which go beyond the control of the caregivers.

Chapter 3: Methodology

The following chapter outlines the methodological approach for comparing individual and group physiotherapy treatment models for children with CP in Ghana.

3.1 Study design

The study used a quasi-experimental design. The study was premised on a studyconducted to compare the outcome of two models of CP rehabilitation in Zimbabwe (Dambi & Jelsma, 2014) and in Bangladesh (Karim et al., 2021). A quasi experimental research design is a type of study design in which the quasi-independent variable cannot be manipulated or controlled and study participants are not randomly assigned to either conditions or orders of conditions being studied (Cook & Campbell, 1979). The study design involves pre-intevention recording of baseline data, followed by post-intervention records from participants. The independent variables were CP and and physiotherapy treatment.

3.2 Sampling Technique

A purposive sampling method was used during the selection process. This was because the average number of children with spastic cerebral palsy identified from the registries at both facilities were not many for a simple randomised sampling method. From the registries, the average number of Children seen per day was 7 at the Ho Teaching Hospial and 6 at Korle-bu Teaching Hospital. CP clinics run two times a week at both facilities. The formulae used to calculate the sample size was the formulae for comparison between two groups (Charan & Biswas, 2013), 95% confidence interval. Aminimum sample size of 16 participants (child/caregiver dyad) was obtained. Using a 20% drop out rate, a maximum sample size of 39 participants (child/caregiver dyad) was calculated.

3.3 Study population

Children who had physical presentations of SCP and their caregivers (child-caregiver dyad) were recruited to participate in the study. Children from two to twelve years of age were considered for the study. The selected age range was since children within this age range who have CP, would have already had an established diagnosis and would already be receiving treatment at the physiotherapy units of both hospitals.

3.4 Inclusion and exclusion criteria

3.4.1 Patient inclusion criteria

All children, between the ages of two to twelve with SCP (physical impairments of increased tone, brisk reflexes and delay in acquiring gross motor development milestones) and who were receiving physiotherapy treatment or who were referred for physiotherapy treatment at the outpatient departments of the Ho and Korle-bu- Teaching Hospital, were eligible to be included in the study.

3.4.2 Patient exclusion criteria

All children with any other neurological condition resulting in abnormal development were excluded like spinal bifida, hydrocephalus and other congenital childhood syndromes. Children with Spastic CP who are receiving extra therapeutic interventions at home were excluded. All children with Ataxic, Dyskinetic and Mixed types of cerebral palsy were also excluded.

3.4.3 Caregiver inclusion criteria

A person who regularly brought a child to physiotherapy as well as handled everything related to the child's welfare was eligible to participate.

3.4.4 Caregiver exclusion criteria

Persons younger than eighteen years of age, and who are not the usual carers of the child were excluded. All other individuals who were relatives but had no direct responsibility for the treatment and daily care needs of the child were also excluded.

3.5 Physiotherapists

The physiotherapists who were employed and treated the children with CP at each hospital continued their usual treatment models which was IPTM at the Korle-bu Teaching Hospital and GPTM at the Ho Teaching Hospital.

3.6 Sample size calculation

The power calculation was considered for the purpose of determining the number of cases. In a previous study by Dambi & Jelsma, 2014, the burden of care, as measured by the modified caregiver strain index was used to calculate the sample size and it was one of the primary outcomes under examination. They assumed mean Caregiver Strain Index (CSI) scores of 7 and 9 (SD = 2). The current study replicated this method also by using the modified caregiver strain index primary outcome under examination. The parameters used were alpha = 0.05, power of 80%, effect size of (d) = 2. The formulae used to calculate the sample size was the formulae for comparison between two groups (Charan & Biswas, 2013).

A minimum sample size of 16 participants (child and caregiver dyad) per treatment model was calculated. However, to account for 20 % attrition or dropout rate, the maximum sample size of 39 participants (child and caregiver dyad) per treatment model or group was calculated.

$N = \frac{2\,(SD)^{2}\,(Z\alpha/_{2} + Z_{\beta})}{d^{2}}$, (Charan & Biswas, 2013)

N= sample size

SD = standard deviation from previous a study (Dambi & Jelsma, 2014)

$Z\alpha/_{2} = Z0.05/2$

$Z\alpha/_{2} = Z0.025$

$Z\alpha/_{2} = 1.96$ (from z table) at type 1 error of 5%,

$Z_{\beta} = Z0.02$

$Z_{\beta} = 0.84$ (from z table) at 80% power,

d = effect size (difference between mean values = 2),

Therefore;

$n = \frac{2\,(2)^{2}\,(1.96+0.84)^{2})}{2^{2}}$

$n = \frac{2\,(4)\,(2.8)^{2})}{2^{2}}$

$n = 15.68$

$n= (2(2^{2})\,(1.96+0.84)^{2})/d^{2}= (2(4)\,(2.8^{2}))/2^{2}=15.68=16$

It was expected that there will be 20% or 0.2 attrition rate or proportion expected to dropout, therefore adjustments will be done to obtain N_{final} which is the final sample size.

N_{final}= 2(n) / (1- expected proportion dropout rate or attrition rate)

N_{final}= 2(n) / (1-0.2) = 2(15.68) / 0.8, N_{final} = 39.2

Therefore, a minimun sample size of 16 (child and caregiver dyad) participants and a maximum sample size of approximately 39 participants (child and caregiver dyad) per treatment model or group was required.

3.7 Instrumentation

3.7.1 Functional Performance tools

3.7.1.1 GMFCS E&R

The revised and expanded version of the GMFCS E&R is a classification system that describes the gross motor ability of children with CP on five ordinal levels across five age bands (see Appendix 1), with the emphasis on the child's typical functional performance in different settings eg. Home, school etc (Reid et al., 2011). The age bands are less than 2 years of age, 2 to 4 years, 4 to 6 years, 6 to 12 years and 12 to 18 years. The first four age bands will be used in this study. Reliability and validity have been established in various studies for this context (Love et al., 2010; Palisano et al., 2008). This outcome measure was administered by the researcher at base line and post intervention, after three months of physiotherapy.

3.7.1.2 GMFM-88

This instrument is valid and reliable tool in measuring the change in motor function of children with cerebral palsy (Ko et al., 2013; Josenby et al., 2009; Russell et al., 2015). It has items which describe specific milestones in five dimensions (Dimension A: Lying & Rolling, Dimension B: Sitting, Dimension C: Crawling & Kneeling, Dimension D: Standing & Walking, Dimension E: Running & Jumping) (see Appendix 2). Each item is scored according to the child's ability to self-initiate the function 0 = does not initiate, 1= initiates, 2= partially completes, 3= completes and 9 (or leave blank) = not tested. This outcome measure was administered by the researcher at baseline and after three months physiotherapy.

3.7.1.3 MACS and Mini-MACS

Elliason et al., 2006 developed a tool for measuring how children with CP use their hands, the Manual Ability Classification System (MACS) (see Appendix 3). The modified version, the Mini-MACS caters for measurement for CP children below the age of 4 years (see Appendix 4). Both MACS and mini-MACS would be used for the research since the age range under consideration is from 2 yearsto 12years. MACS and mini-MACS both have a 5-level ordinal scale where level one refers to children whose hand function is least affected and level five means the child does not handle objects and has severely limited ability to perform even simple activities with the hands (requires total assistance) (Eliasson et al., 2006). validity and reliability of both tools have been tested (Eliasson et al., 2006; Eliasson et al., 2016; Morris, 2007; Silva et al., 2015). The researcher administered this outcome measure at baseline and after three months physiotherapy.

3.7.2 Demographic questionnaire

This included two separate tables of the demographic/clinical characteristics of the child and the caregiver demographics. It included the following;

- The child demographics included; age of child, sex, time at which physiotherapy started at their various facilities, cerebral palsy subtype, risk factors, comorbidities, types of treatment given, type of model whether grouped or individualized (see Appendix 5).
- The caregiver demographics included; their age, sex, marital status, relationship with the child, educational level, occupation, language easily spoken, location and lastly the distance of where they stay to the Facility (see Appendix 6).

3.7.3 Caregiver tools

Measuring the burden of care using the Modified Caregiver Strain Index, (MCSI)

The modified care giver strain index (MCSI) consists of 13 sub- questions asking how stressed the care giver feels with regards to: employment, financial, physical, social and time. Answers “Yes, on a regular basis” =2, “Yes sometimes=1, No=0. A score of 7 or higher indicates a high level of stress (see Appendix 7). It has been validated and its reliability has been proven for caregivers of children with special needs especially cerebral palsy (Dambi & Jelsma, 2014; Robinson, 1983). As part of the study, this questionnaire was translated into the local language and tested for its contextual validity and administered by the researcher at baseline and after three months.

Measuring Health-Related Quality of Life (HRQoL) of caregiver using EQ-5D-3L version

The EuroQol Foundation developed the HRQoL questionnaire and improved upon it by developing various versions Health Related Quality of Life. The wellknown patient versions are the EQ-5D-3L, EQ-5D-5L and EQ-5D-Y (Devlin et al., 2020). Studies have shown that the EQ-5D-5L has a high precision and responsiveness to change (Devlin et al., 2020; Garratt et al., 2021; Thompson & Turner, 2020). However, the researcher chose the EQ-5D-3L version because it was highly acceptable to patients and feasible for application where a short-form general measure of health is required. The questionnaire is a self-report of the caregiver's Health Related Quality of Life (HRQoL), on five dimensions, namely mobility, self-care, usual activities, pain/discomfort, and anxiety/depression (Saarni et al., 2006) (see Appendix 8). Each dimension has three levels of severity (no problems, slight problems/moderate problems and severe problems/extreme problems). The questionnaire also includes a Visual analogue scale (VAS), with zero representing worst imaginable health and hundred representing best imaginable health (Appendix 8). Its reliability and validity of this questionnaire have been tested (Knies et al., 2009; Noyes & Edwards, 2011). This study used the VAS scores of EQ-5D-3L questionnaire of HRQoL for analysis**.** The questionnaire was translated into the two local languages (Ewe and Twi), tested for contextual validity and finally administered by the researcher at baseline and again after three months.

Measuring patient satisfaction with service provision using MedRisk Instrument for Measuring Patient Satisfaction with Physical Therapy Care (MRPS).

This questionnaire was used in measuring patient satisfaction and identifying which factors may influenced patient report of satisfaction. It includes external, internal and global factors affecting satisfaction. Scoring is on a 1-5 rating likert scale for each item (1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree) (see Appendix 9). It has been proven to be a valid and reliable tool (Beattie et al., 2002). This questionnaire was also translated into the two local languages (Ewe and Twi), tested for contextual validity and finally administered by the researcher at baseline and again after three months.

3.7.4 Measuring attendance.

The attendance was used to record the number of times the child/caregiver dyad attends the physiotherapy unit for treatment. It entailed the list of the initials of the children with CP at the various hospitals against the dates are they expected to attend the clinic (see Appendix 10). As part of their usual routine, participants were expected to attend treatment once a week, whether it was individual or group therapy. The researcher and research assistant kept a record of daily attendance while the participants attended their routine physiotherapy sessions. This was documented in the form of a table. Additionally, the type of treatment approaches or techniques used during each treatment session at both hospitals were also documented on the attendance table by the therapist (see Appendix 10).

3.8 Procedure

3.8.1 Testing of questionnaires for contextual validity

The caregiver questionnaires (MCSI, EQ 5D 3L a version of the HRQoL and MRPS) have been tested for their validity and reliability in English (Beattie et al., 2002; Knies et al., 2012), but were tested again for contextual validity after translating in the local languages for the two geographical areas of the hospitals (Ewe and Twi). The questionnaires were taken through a forward and backward translation process. Independent translators were asked to translate the English versions into Ewe and Twi. The translated versions were tested on caregivers of children with other conditions other than cerebral palsy for factual correctness. Changes were made as required, and the versions were then sent for backward translation into English by translators who were different from the first translators. A few ambiguities were identified for both questionnaires and then corrected by the first translators at the meeting with the committee of experts where the final translations were accepted (see Appendix 17).

3.8.2 Recruitment

Recruitment of therapists

After ethical approval and permission to conduct the research at each hospital were obtained, the researcher organised a face-to-face meeting with the physiotherapists who regularly treat the children with CP at the two Hospitals. This was to explain the purpose of the study and their role in the research. The therapists were informed to continue their normal treatment for children with Spastic CP. The researcher and research assistant collected the pre and post data. Therefore, the research did not interfere with any of the routines (see Appendix 24, 25, 26 and 27 for details).

Recruitment of caregiver/child dyad

The researcher visited both hospitals twice weekly during the recruitment period and identified children with Spastic CP who qualified for inclusion into the study, from the medical records or registries. These children and their regular caregivers were recruited in a face-to-face interview by the researcher and research assistant at both hospitals, during their usual physiotherapy visit. It was done in a private, quiet room. The purpose of the research and their participation was explained and informed consent obtained. For those who did not speak English, it was translated in their home languages (Ewe and Twi) (see Appendix 17), to sign. Assent was sought from children with appropriate cognitive functioning, as they are expected to understand the concept (see Appendix 13). Children with CP who were well orientated to time and place, payed attention, understood the concept of informed assent, and remembered what was explained, had their informed assent taken by the researcher. At this point, the participant's demographic data was obtained by the researcher and research assistant as well as baseline measurements (see Appendix 5 and 6). During their 3-month attendance for treatment, researcher/research assistant recorded attendance including reasons of non-attendance when the carers do not attend scheduled clinic appointments (see Appendix 10). Caregivers continued to bring their children for their usual physiotherapy treatment at their various hospitals and recruitment at both hospitals followed the same format. Photo consent and assent were obtained from the caregivers and children whose photos were taken in Appendix 12 and 14.

3.8.3 Intervention

Following the completion of baseline measurements, the participating children had their routine physiotherapy treatment sessions at the hospitals and they were treated by their usual physiotherapists. Children treated at Korle-bu Teaching Hospital received individual treatment and children at Ho Teaching Hospital were treated in groups.

At Korle-bu Teaching Hospital, patients were seen and treated on a mat, by the wall bar, staircase or using walkers to train gait depending on the goals of the therapist. The children were treated by the therapist and the caregivers sat in to watch the sessions. Also, their treatment goals were individualized and caregivers are taught home excercises as well. Treatment interventions used here during therapy were massage, passive mobilisations, neck control/trunck control exercises, rolling exercises, sitting exercises, standing exercises and walking exercises, stair case climbing exercises, lower limb strengthening exercises, 4-point kneeling exercises, transitional exercises (eg. from lying to sitting, sitting to standing or standing to walking) etc. Materials used here are the mat, wallbars, staircase, wooden walkers, foam rollers, medicine ball, toys, parallel bar, standers, wedge, corner seats, wooden seats, lasting hour duration per session. These therapies are family centered and particularly tailored to achieving the child's ability to achieve a developmental milestone. Goals are developed on short term basis and clients are reviewed from time to time and their goals were changed as the progress until their long-term goals are achieved. Once their assessment, treatment plan and treatment for each child is documented, their treatment can be handled by another therapist in the pediatric team (see Appendix 29 of the report from the Physiotherapist in charge of the Pediatric unit of the Korle bu Teaching Hospital).

At Ho Teaching Hospital, patients are seen in groups involving the therapist and caregivers of the children with CP. Children whose treatment goals are similar are seen in groups whilst undergoing treatment and the therapist focuses on teaching the caregivers how to handle the children while performing their various treatment. Therapists here follow a standardized protocol designed for rehabilitation in each group (see Appendix 28 of the report from the Physiotherapist in charge of the Pediatric unit of the Ho Teaching Hospital). The treatments are aimed at the achievement of their various goals for each group. Any child who improves functionally will be progressed to the next group with a higher goal. Materials used here, are specific for each group for instance Group 1 and 2 use mats, swiss balls, wedges, rollers, wobble boards, passive standers, sitting frames. Group three and four mostly use assistive devices such as walkers, standers, gaiters, hoists, zimmerframes, parallel bar, wall bar and so on (see Appendix 28 of the report from the Physiotherapist in charge of the Pediatric unit of the Ho Teaching Hospital). Attendance was noted by the researcher/research assistant for the three months using an attendance table.

3.8.4 Post-Intervention Measurements

After three months of treatment, the researcher administered the following outcome measures and questionnaires to the caregiver, after a routine treatment session:

- GMFCS E&R, GMFM-88 and MACS.
- MRPS, MCSI, (EQ-5D-3L) HRQoL questionnaire.

3.8.5 Pilot Study

The questionnaire was piloted on a convenient sample of 15 caregvers and children recruited from both hospitals. The purpose of this was to assess the caregiver questionnaires which have been translated for construct and face validity. The reliability of the translated questionnaires (Modified caregiver strain Index (MCSI) and Medrisk Satisfaction with Physical Therapy questionnaire (MRPS) and Inter-Rater validity of GMFM-88 were tested. A research assistant was trained and given roles during the pilot study period to independently perform specific tasks during data collection). There were serveral occasions where she sat in an interview organised by the researcher and a caregiver to observe how the questions were being asked and learn vocabularies that were used filling the caregiver questionnaires. Lessons were drawn from the pilot study and these informed the researcher on how to organize the interviews for the actual data collection (see Appendix 24).

3.8.6 *End of Study and dissemination of findings*

Post-trial treatment was continued as per their usual treatment schedule. After results were obtained, research findings were disseminated through conference presentations and scientific peer reviewed journals. The physiotherapists who treated the paediatric cases especially children with cerebral palsy were informed about the findings through online conference presentations organised by the researcher. The main aim of the above was to update physiotherapists in Ghana on which treatment model to consider in the Ghanaian setting.

3.9 Data Management and Storage

Hard copies of the outcome measures/ questionnaires completed by the researcher and therapist were stored in a locked cupboard at each hospital. All participants were allocated a code, instead of a name, maintaining confidentiality and anonymity. All data was captured on a password protected Excel spreadsheet (Microsoft Office Excel 2019) and cloud storage, only accessible by the researcher and supervisors. The hard copies of outcome measures and questionnaires were kept in a locked cupboard in a secure office. Data was captured on an excel spreadsheet and exported to a statistical package for analysis (SPSS version 26).

3.9.1 Statistical Analysis

Descriptive statistics was used for demographic data frequencies. Prior to comparison of baseline and end line data, the Shapiro-Wilk test was conducted to check for normality. For normally distributed data, independent sample t-test was applied for comaprsion of ITM and GTM. For data that was not normally distributed data, the Mann Whitney U test was used to test indepent samples at baseline and endline. Pearson's Chi square test was used for comparison of categorical variables (GMFCS E&R, MACS/mini-MACS) and to determine likelihood ratio for associations.

For between model and within group comparisms, means with their corresponding standard deviations or medians were determined for continuous variables (GMFM-88, VAS scores of HRQoL and MCSI scores). All analyses were performed using SPSS version 26 ($p < 0.05$) (George & Mallery, 2019).

3.10 Ethical Consierations

Ethical approval

Ethical Approval was obtained from the Human Research Ethics Cmmittee at the Faculty of Health Sciences, University of Cape Town (HREC No. 296/2022) see Appendix 18. Permision to conduct research was also obtained from Korle-bu Teaching Hospital and Ho Teaching Hospital (Appendix 19, 21 and 22). Quality assurance was maintained through taking into consideration the following ethical considerations.

Autonomy

All **children** with Spastic CP and caregivers attending physiotherapy departments for their routine physiotherapy treatment and who meet the inclusion criteria were given written and verbal information about the research project. Their role in the study, the risks and benefits, the confidentiality of their information and their right to refuse to take part in the study or withdraw at any point, were explained. Informed consent (see Appendix 11 for Informed Consent Forms) was obtained from all willing care givers, with a signature or thumb print as appropriate. In addition, consent and assent was taken for the publishing of photographs (Appendix 12 and 14). Any caregiver who did not want to participate in the research was not forced to do so or even discriminated against. Their child still received routine physiotherapy as before.

Confidentiality

The researcher made the therapists understand the need of making those participating in the research known to only the researcher, research assistant and therapist. All assessment and reviews sessions were normally done on a one-on-one basis at both hospitals. Therapists in the grouped therapy model only perform treatment sessions in a group and under no circumstance was a patient information and progress be shared during treatment sessions. No participants or research facility was identified in the analysis or write-up of the research. All patient names were assigned codes in order to ensure confidentiality.

Beneficence and non-maleficence

Participating or not participating in the study did not alter the routine physiotherapy treatment or care the child usually received. As the participants were receiving their usual physiotherapy management, there was no known risks to participating in the study and no insurance was required for research related injuries. The caregivers were not be reimbursed as they did not incur any extra costs by participating in the study. The outcome of the study informed future best practice for children with CP. No signs of neglect or abuse was noted, therefore no referral to the necessary authority was made in line with legal requirements.

Justice

All children with Spastic CP and their caregivers, attending either of the Hospitals for physiotherapy treatment and who fulfilled the inclusion criteria were invited to participate. No-one was discriminated against based on ethnic group, gender preference, religion or any other reason.

Vulnerability of participants

Caregivers participating in the study were made to understand in their consent that there were minimal risks associated in undergoing therapeutic interventions and that these risks were no higher by participating in the study. The children with CP are vulnerable due to their age, condition and cognitive limitations in some cases. Their vulnerability was protected by ensuring that their caregivers were present at all times and that they were treated by therapists who were trained to manage these vulnerable children. Caregivers or children who were emotionally distressed while completing the outcome measures or questionnaires were counselled by the physiotherapists best known to the participant and study procedure was terminated. The therapists monitored these the children for any sudden changes in their overall health as they reported for treatment. Those children who had issues with their health as they reported for treatment were seen by a medical doctor. The assent of children with CP who have appropriate cognitive functioning was added to the consenting procedures. Children with CP who were well oriented to time and place, payed attention, understood the concept of informed assent, and remembered what was explained, had their informed assent taken by the researcher.

3.11 Flow Diagram of study participants

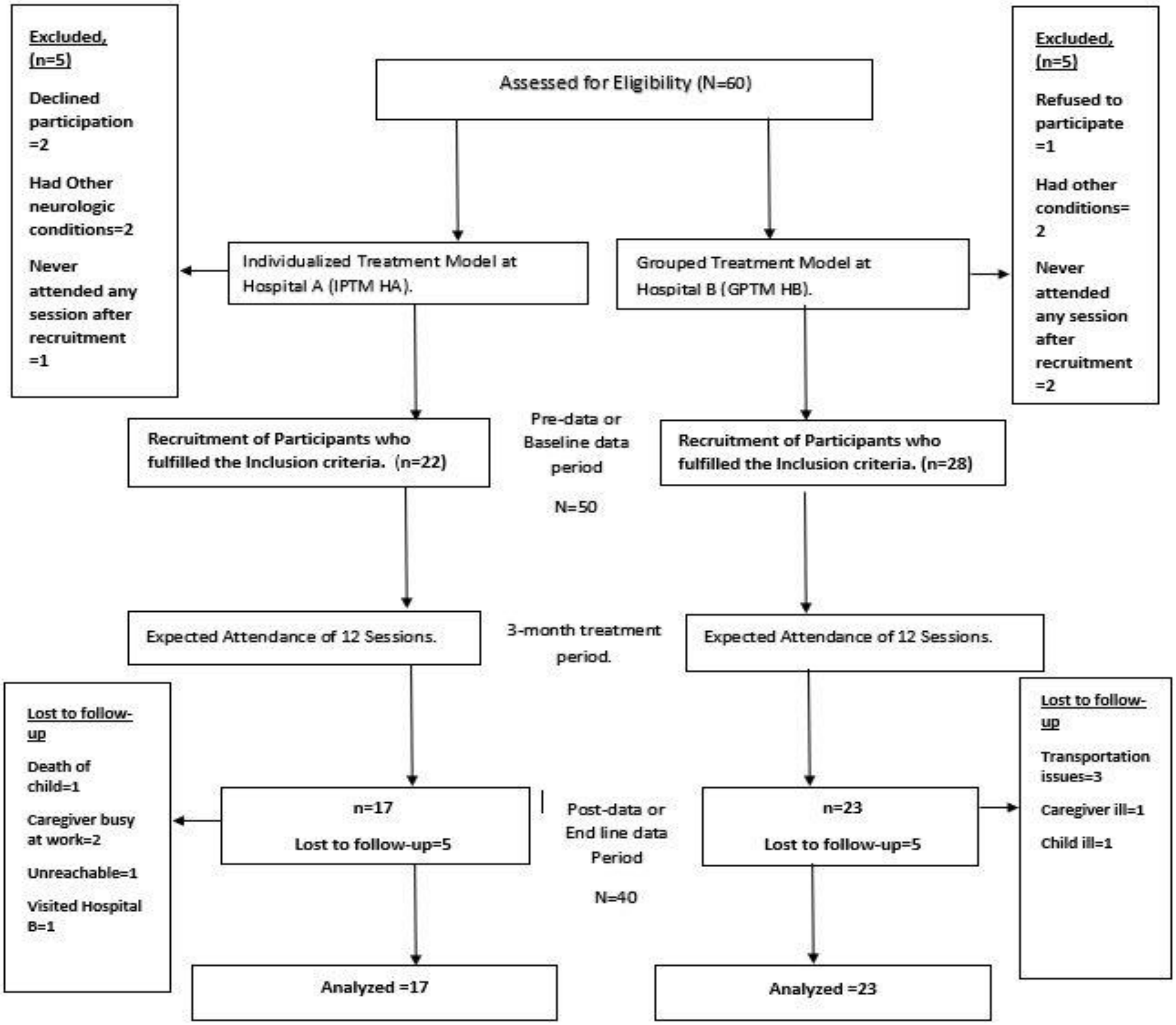

Figure 1: An Overview of the study.

A flow chart summarizing of the sequential steps taken in the study, which included the number of participants recruited, those that did not attend follow up appointments at the end of the three-month period.

Chapter 4: Results

4.1 Introduction

This chapter will present the results related to the following objectives:

- Description of the demographic information of CP children and their caregivers.
- Comparison of GMFCS, MACS/mini-MACS, GMFM-88, VAS scores of HRQoL, MCSI and MRPS outcomes;
  - between the two treatment models at pre- treatment (baseline)
  - between the two treatment models after 3 months (post-treatment)
  - comparison of pre and post treatment outcomes within treatment models.
- Compare caregivers' attendance to therapy by analyzing the attendance.

At baseline, a total number of 60 potential participants were approached for recruitment, as seen in Figure 1. into this study and out of the above number, a final total of N=50 participants were included for the study, 10 did not meet the inclusion criteria or declined participation in the study at the two hospitals. Out of the 50 participants, 22 participants (child/caregiver dyad) were recruited from the IPTM and 28 participants (child/caregiver dyad) from the GPTM. The final sample size of N=41 participants (caregiver and child dyad) was obtained after the end line measurements. These are participants who came for the final measurements after 3 months of receiving treatment at both hospitals. A total of n=10 participants were lost to follow-up and a total of 40 participants were the final sample size for data analysis. Total number of participants for the IPTM were n=17 and that of the group therapy were n=23. The flow chart below explains it further.

4.2 Demographics of children with cerebral palsy and their respective caregivers

4.2.1 Child demographics

A total of 50 children were enrolled in the study as shown in the Table 4.1. The age, sex and type of SCP was recorded for all children with CP. Information on the birth history was obtained to establish the risk factors and comorbidities associated with CP.

The mean ages, M(SD), of the children who had IPTM (*n* = 22) was 5(3) and that of GPTM (*n* = 28) was 6(3). Age data obtained from both treatment models were of normal distribution for both IPTM (*p* = 0.005) and

GPTM (*p* = 0.046). Therefore, an independent t-test showed no significant difference in the mean ages of the children from IPTM and GPTM (df = 47.4, p = 0.119). Pearson's chi square test was used to analyze any significant difference between models for sex and the type of CP. The results showed no significant difference was observed between treatment models for sex (chi square (χ^2)= 0.298, df = 1, p = 0.585) and type of CP (chi square (χ^2)= 3.963, df = 2, p = 0.138).

The commonest risk factors identified from IPTM was birth asphyxia (foetal distress), prematurity (low birth weight) and prolonged labour (delayed delivery) with 18.8% each and that of GPTM is birth asphyxia. In addition, the most common comorbidity identified from both groups was seizures with 55.6% from IPTM and 35.5% from GPTM.

Table 4. 1: Summary of demographic data for children with CP.

Child Demographics	**IPTM N =22**	**GPTM N =28**	**Total N=50**	**Statistic**	**p- value**
Age of Child in years, Mean (SD)yrs	5(3)	6(3)	5(3)	t=-1.587	0.119
				df = 47.4	
	n(%)	n(%)	n(%)		
Sex					
Female	7(31.8%)	11(29.3%)	18(36.0%)	χ 2 = 0.298	0.585
Male	15(68.2%)	17(60.7%)	32(64.0%)	df = 1	
Type of CP					
Spastic Diplegic,	2(9.1%)	8(28.6%)	10(20.0%)	χ 2 = 3.965	0.138
Spastic Hemiplegic	0	1(3.6%)	1(2.0%)	df = 2	
Spastic Quadriplegic	20(90.9%)	19(67.9%)	39(78.0%)		
Risk Factors					
Birth Asphyxia (Foetal Distress)	6(18.8%)	9(33.3%)	15(25.4%)	χ 2 = 9.417	0.308
Fever (Infections)	3(9.4%)	1(3.7%)	4(6.8%)	df = 8	
High Birthweight	1(3.1%)	0	1(1.7%)		
Neonatal Jaundice	3(9.4%)	8(26.9%)	11(16.4%)		
Preeclampsia (High Blood Pressure)	5(15.6%)	3(11.1%)	8(13.6%)		
Prematurity (Low Birth Weight)	6(18.8%)	4(14.8%)	10(16.9%)		
Prolonged Labour (Delayed Delivery)	6(18.8%)	2(7.4%)	8(13.6%)		
Birth Complications (Entangled or Nuchal Cord)	1(3.1%)	0	1(1.7%)		
Forced /Induced Delivery	1(3.1%)	0	1(1.7%)		
Comorbidity					
Breathing Or Respiratory Difficulties (Pneumonia)	3(16.7%)	5(16.2%)	8(16.2%)	χ 2 = 7.252	0.203
Feeding and Swallowing Difficulty	3(16.7%)	4(12.9%)	7(14.3%)	df = 5	
Seizures	10(55.6%)	11(35.5%)	21(42.9%)		
Malnutrition	1(5.6%)	7(22.6%)	8(16.3%)		
Gastric Issues	1(5.6%)	0	1(2.0%)		
No Bladder Control	0	4(12.9%)	4(8.2%)		

* IPTM-Individual Physiotherapy Treatment Model, GPTM- Group Physiotherapy Treatment Model, χ 2- Pearson’s chi square test, df – degree of freedom, t- independent samples t test, mean (SD)-mean (standard deviation) and p-p-value.

4.2.2 Caregiver demographics

A total of N=50 caregivers were recruited for the study. Caregivers consisted of mostly mothers (n = 43) representing 86% for both models while a small percentage of cargivers from IPTM, were fathers (n =2). Majority (40.9%) of the caregivers from IPTM of caregivers age ranges were from 21 - 67 years and had attained tertiary level education while 32.1% of the caregivers from GPTM had senior high school educational level, ranging in age from 23 to 64 years. Also, a total of 66% of the caregivers from both groups were employed either formally or informally. Most of the caregivers (86.4%) from IPTM were married while 50% of those from GPTM were divorced (see Table 4.2 on caregiver demographics).

Table 4. 2: Summary of demographic data for caregivers.

Caregiver Demographics	IPTM N =22	GPTM N =28	Total N=50	Statistic	p- value
Age of Caregiver in years,	39(10)	37(9)	38(10)	t =0.579	0.565
Mean (SD)	21-67	23-64		df =42.258	
Range					
Sex					
Male, n (%)	2(9.1%)	0	2(4.0%)	χ 2 = 2.652	0.103
Female, n (%)	20(90.9%)	28(100%)	48(96.0%)	df = 1	
Primary Caregiver					
Father	2(9.1%)	0	2(4.0%)	χ 2 = 3.469	0.325
Foster Mother	0	1(3.6%)	1(2.0%)	df = 3	
Grand mother	2(9.1%)	2(7.1%)	4(8.0%)		
Mother	18(81.8%)	25(89.3)	43(86.0%)		
Marital Status					
Divorced	2(9.1%)	14(50.0%)	16(32.0%)	χ 2 = 10.34292	0.006
Married	19(86.4%)	12(42.9%)	31(62.0%)	df = 2	
Widow	1(4.5%)	2(7.1%)	3(6.0%)		
Caregiver Educational Level					
No School	0	2(7.1%)	2(4.0%)	χ 2 =	0.092
Primary School	2(9.1%)	6(21.4%)	8(16.0%)	7.97822	
Junior High School	4(18.2%)	8(28.6%)	12(24.0%)	df = 4	
Senior High School	7(31.8%)	9(32.1%)	16(32.0%)		
Tertiary	9(40.9%)	3(10.7%)	12(24.0%)		
Caregiver Employment Status					
Formally Employed	5(22.7%)	3(10.7%)	8(16.0%)	χ 2 =	0.210
Informally Employed	8(36.4%)	17(60.7%)	25(50.0%)	3.123806	
Unemployed	9(40.9%)	8(28.6%)	17(60.7%)	df = 2	
Distance to the Hospital				U=213.50, W=466.5	
Distance in Km, Median	8.4	18.9	11.0	Z= -1.849, r =0.3	0.064

* IPTM-Individual Physiotherapy Treatment Model, GPTM- Group Physiotherapy Treatment Model, U -Mann Whitney U test, df – degree of freedom, t- independent samples t test, r- effect size, χ 2- Pearson's chi square test, r-effect size, W- Wilcoxon W, Z- Z score or standardized test, mean (SD)-mean (standard deviation) and p-p-value.

4.3 Pre-Treatment Results

Pre-Functional Outcomes

This section shows the analysis of the functional outcomes which compares the two treatment models at the beginning of the study. The functional measurements were their GMFCS E&R levels, MACS/mini-MACS levels and the GMFM-88.

The GMFCS E&R the results showed that a majority of the children n (18), were within level V with 36.4% from IPTM and 35.7% from GPTM. Their hand function levels using MACS/mini-MACS also showed that most of the children in IPTM were between Level V and Level II (27.3% each) while those from GPTM were at Level V (42.9%), refer to Table 4.3.

There was no significant difference in the GMFCS E&R between the two treatment models (χ 2 = 0.249, df = 3 p=0.969). Similarly, there was no significant difference between MACS/ mini-MACS levels between the two treatment groups (χ 2 = 7.676, df = 4, p=0.104 (see T able 4.3).

The GMFM-88 scores obtained were not normally distributed (with Dimension A% p=0.000, Dimension B% p=0.002, Dimension C% p=0.000, Dimension D% p=0.000, Dimension E% p=0.000, Total Dimension p=0.010). Results obtained revealed that there was significant difference in dimensions and their total between the two groups at baseline with p-values (A% p=0.873, B% p=0.450, C% p= 0.328, D% p=0.779, E% p=0.846 and Total Dimension=0.846) with generally weak effect sizes. The table below gives further details on the results (refer to Table 4.3).

Table 4. 3: Comparison of functional outcomes at pre-treatment for both models.

Functional Outcome	IPTM 22 (100%)	GPTM 28 (100%)	Total 50 (100%)	Statistic	p-value
Pre-GMFCS E&R					
LEVEL I	0	0	0	χ 2 = 0.249 df = 3	0.969
LEVEL II	3(13.6%)	4(14.3%)	7(14.0%)		
LEVEL III	5(22.7%)	5(17.9%)	10(35.7%)		
LEVEL IV	6(27.3%)	9(32.1%)	15(30.0%)		
LEVEL V	8(36.4%)	10(35.7%)	18(36.0%)		
Pre MACS/ min-MACS levels					
LEVEL I	3(13.6%)	6(21.4%)	9(18.0%)	χ 2 = 7.676 df = 4	0.104
LEVEL II	6(27.3%)	2(7.1%)	8(16.0%0		
LEVEL III	5(22.7%)	2(7.1%)	7(14.0%0		
LEVEL IV	2(9.1%)	6(21.4%)	8(16.0%)		
LEVEL V	6(27.3%)	12(42.9%)	18(36.0%)		
PRE-GMFM -88	**IPTM** **N =22**	**GPTM** **N =28**	**Total** **N=50**	**Statistic**	**p-value**
Dimension A%, Median	64.7	68.6	68.6	U= 316.0, Z= 0.160, r =0.02	0.873
Dimension B %, Median	29.2	25.0	26.7	U= 346.5, Z= 0.756, r =0.11	0.450
Dimension C%, Median	0.0	4.8	4.7	U= 355.5, Z= 0.977, r =0.14	0.328
Dimension D%, Median	0.0	0.0	0.0	U= 320.5, Z= 0.280, r =0.04	0.779
Dimension E%, Median	0.0	0.0	0.0	U= 299.5, Z= -0.194, r =0.03	0.846
Total Dimension, Median	19.4	19.5	19.5	U= 329.5, Z= 0.420, r =0.06	0.846

* IPTM-Individual Physiotherapy Treatment Model, GPTM- Group Physiotherapy Treatment Model, U -Mann Whitney U test, df – degree of freedom, t- independent samples t test, r- effect size, χ 2- Pearson's chi square test, r-effect size, W- Wilcoxon W, Z- Z score or standardized test, mean (SD)-mean (standard deviation) and p-p-value.

Pre-Caregiver Outcomes

The analysis of scores of modified caregiver strain index (MCSI), VAS scores of the health-related quality of life questionnaire (EQ5D 3L version of HRQoL) and Medrisk satisfaction with physical therapy questionnaire (MRPS) were performed in this section to reveal the differences between treatment models.

Modified Caregiver Strain Index (MCSI)

Data obtained from IPTM was not normally distributed (p=0.135), However, GPTM was normally distributed (p=0.001). A Mann Whitney U test revealed a significant difference between the two treatment models (IPTM, Md.16.5, n=22 and GPTM, Md=21.0, n=28) with U=470.0, Z=3.178, P=0.001 and a moderate effect size (r)=0.4 (see Table 4.4).

Health Related Quality of Life (HRQoL)

Data obtained for the VAS scores of HRQoL from both treatment models was normally distributed with mean scores from IPTM, 72.3(17.4), p=0.195 and GPTM, 70.4(20.1), p =0.099. An independent t- test indicated no significant difference between mean score with p-value (p=0.720), t=0.360 and df=47.5 (see Table 4.4).

Medrisk Satisfaction with physical therapy questionnaire (MRSP)

Data obtained from the Medrisk Satisfaction responses was analysed using a 5-point Likert scale. This was used to assessed the caregiver's satisfaction with physical therapy (Refer to Table 4.4). Analysis of the frequency and percentages of the most popular responses were tabulated (see Appendix 22) and represented graphically. From fig 4 and 5, it can be seen that most of the caregivers from IPTM "stongly agreed"and that of GPTM "agreed".

Generally, data of the responses obtained from both treatment models were not normally distributed therefore, a Mann Whitney U test was done. Results obtained revealed a significant difference between the two groups at baseline or pre measurement with p=0.001, U=133.0, Z=-4.31 with a strong effect size, r=0.6 (see Table 4.4).

Table 4. 4: Comparing Caregiver outcomes at pre-treatment period of the study

Caregiver Outcomes	IPTM	GPTM	Total	Statistic	p-value
MCSI					
Median	16.5	21.0	20.0	U=470.0, Z=3.178, r=0.4	0.001
VAS scores ofHRQoL					
Mean	72.3(17.4)	70.4(20.1)	71.2(18.8)	t=0.360, df=47.5	0.720
MRPS					
Median	4.2	3.7	3.9	U=133.0, Z=-4.31, r=0.6	0.001

* IPTM-Individual Physiotherapy Treatment Model, GPTM- Group Physiotherapy Treatment Model, MCSI- Modified Care giver Strain Index, VAS scores of HRQoL- Visual Analogue Scale of Health-Related Quality of Life, U -Mann Whitney U test, df –degree of freedom, t- independent samples t test, r- effect size, χ 2- Pearson's chi square test, r-effect size, W- Wilcoxon W, Z- Z score or standardized test, mean (SD)-mean (standard deviation) and p-p-value.

4.4 Post-Treatment Results

Post Functional Outcomes

Frequencies and percentages were used to describe the data obtained from the two treatment models. Results of GMFCS E&R levels showed a majority (29.4% each) of the participants were at levels IV and V for IPTM while majority (34.8%) of participants were at level IV for the GPTM. Results of MACS/ min-MACS levels showed a majority (29.4%) of the participants were at levels I for IPTM while majority (39.1%) of participants were at level V for the GPTM (see Table 4.5).

Results obtained for the GMFCS E&R and MACS/mini-MACS revealed no significant difference in the GMFCS E&R between the two treatment models (χ 2 = 1.561, df = 4, p=0.816). Similarly, MACS/ min-MACS results also showed no significant difference between the two treatment models (χ 2 = 6.649, df = 4, p=0.156), was obtained indicating that the was in the (see Table 4. 5).

The GMFM-88 scores obtained were the various Dimension % for (A, B, C, D, E) and their Total dimensions %. Data obtained were not normally distributed (Dimension A% p=0.000, Dimension B% p=0.002, Dimension C% p=0.000, Dimension D% p=0.000, Dimension E% p=0.000, Total Dimension p=0.001). There is no significant difference for all dimensions and the total with p-values (A% p=1.000, B% p=0.858, C% p= 0.753, D% p=0.786, E% p=0.927 and Total Dimension % p=0.957) with generally weak effect sizes. The table below gives further details on the results (refer to Table 4. 5).

Table 4. 5: Comparison of functional outcomes at post-treatment period between treaetmnet models.

Functional Outcome	IPTM 17 (100%)	GPTM 23 (100%)	Total 40 (100%)	Statistic	p-value
Post GMFCS E&R					
LEVEL I	1(5.9%)	0	1(2.5%)	χ 2 = 1.561 df = 4	0.816
LEVEL II	2(11.8%)	2(8.7%)	4(10.0%)		
LEVEL III	4(23.5%)	6(26.1%)	10(25.0%)		
LEVEL IV	5(29.4%)	8(34.8%)	13(32.5%)		
LEVEL V	5(29.4%)	7(30.4%)	12(30.0%)		
Post MACS/ min-MACS levels					
LEVEL I	5(29.4%)	7(30.4%)	12(30.0%0	χ 2 = 6.649 df = 4	0.156
LEVEL II	4(23.5)	0	4(10.0%)		
LEVEL III	1(5.9%)	3(13.0%)	4(10.0%)		
LEVEL IV	3(17.6%)	4(17.4%)	7(17.5%)		
LEVEL V	4(23.5%)	9(39.1%)	13(32.5%)		
Post-GMFM -88	**IPTM n =17**	**GPTM n =23**	**Total N=40**	**Statistic**	**p-value**
Dimension A%, Median	70.6	96.0	92.1	U=198.0, Z= 0.000, r =0.00	1.000
Dimension B%, Median	33.3	36.7	36.7	U=191.5, Z= -0.179, r =0.03	0.858
Dimension C%, Median	7.1	2.4	4.8	U=209.0, Z=0.315, r =0.05	0.753
Dimension D%, Median	0.0	0.0	0.0	U=189.0, Z= -0.272, r =0.04	0.786
Dimension E%, Median	0.0	0.0	0.0	U=201.0, Z=0.092, r =0.01	0.927
Total Dimension%, Median	19.9	26.9	26.9	U=200.0, Z=0.054, r =0.01	0.957

* IPTM-Individual Physiotherapy Treatment Model, GPTM- Group Physiotherapy Treatment Model, U -Mann Whitney U test, df – degree of freedom, t- independent samples t test, r- effect size, χ 2- Pearson's chi square test, r-effect size, W- Wilcoxon W, Z- Z score or standardized test, M (SD)-mean (standard deviation) and p-p-value.

Post Caregiver Outcomes.

The Table 7 shows the post scores of the modified caregiver strain index (MCSI), VAS scores of the health-related quality of life questionnaire (EQ5D 3L version of HRQoL) and Medrisk satisfaction with physical therapy questionnaire.

Modified Caregiver Strain Index (MCSI)

The questions from the MCSI sores reveals the burden of caregiving. Analysis of the various responses was shown by the shown by the frequencies and percentages for both treatment model (see Appendix 22).

Data obtained from IPTM with mean scores, 16.8 (5.2) was normally distributed (p=0.522) whilst that from GPTM (with mean scores, 19.5(4.3) was not normally distributed (p=0.016). There was no significant difference between the two treatment models (IPTM, Md.16.0, n=17 and Group Therapy, Md=20.0, n=23) with U=264.5, Z=1.894, p=0.058 and a moderate effect size (r)=0.3 (see Table 4.6).

VAS scores Health Related Quality of Life (HRQoL)

Data obtained for the VAS scores of HRQoL from both treatment models were normally distributed with mean scores from IPTM, 65.3(13.3), p=0.067 and GPTM, 58.3(19.5), p =1.91. An independent t- test indicated no significant difference between mean score with p-value (p=0.183), t= 1.35 and df=37.8 (see Table 4.6).

Medrisk Satisfaction with physical therapy (MRPS) questionnaire

Post MRPS questionnaire responses were analyzed using the frequency and percentages of the most popular response after the various questions were asked (see Appendix 22).

Post data obtained were not normally distributed and results revealed no significant difference between the two treatment groups U=205.0, Z=0.261, p=0.808 and an effect size r =0.04, weak effect size (see Table 4.6)

Table 4. 6: Comparison of caregiver outcomes at post-treatment period between models.

Caregivere Outcomes	**IPTM**	**GPTM**	**Total**	**Statistic**	**p-value**
MCSI Scores					
Median	16.0	20.0	19.0	U=264.5, Z=1.894, r=0.3	0.058
VAS sores of HRQoL					
Mean	65.3(13.3)	58.3(19.5)	61.3(17.3)	t=1.357, df=37.8	0.183
MedRisk Satisfaction					
Median	3.8	4.1	4.0	U=205.0, Z=0.261, r=0.4	0.808

* IPTM-Individual Physiotherapy Treatment Model, GPTM- Group Physiotherapy Treatment Model, MCSI- Modified Care giver Strain Index, VAS scores of HRQoL- Visual Analogue Scale of Health Related- Quality of Life, U -Mann Whitney U test, df – degree of freedom, t- independent samples t test, r- effect size, χ 2- Pearson's chi square test, r-effect size, W- Wilcoxon W, Z- Z score or standardized test, mean (SD)-mean (standard deviation) and p-p-value.

4.5 Change within treatment models.

Change in Functional Outcomes Within Treatment Groups.

Analysis of the pre and post data measurements within each treatment model were done for all functional outcomes and the following results were obtained.

Gross Motor Functional Classification system (GMFCS E&R)

There is no significant difference in the post GMFCS E&R levels (Md 4.0, n=17) for IPTM as compared with the pre GMFCS E&R (Md 4.0, n=17), z = -1.414, p= 0.157 (p> 0.05) with a low effect size of r = 0.24. Similarly, that of GPTM had the same outcome with no significant change in post GMFCS E&R (Md 4.0, n=23) as compared with the pre GMFCS E&R (Md 4.0, n=23), z= 0.000, p=1.000 (p> 0.05) with an effect size of r= 0.000 (refer to Table 4.7).

Manual Ability Classification System (MACS/mini-MACS)

There was **no significant change** in the post MACS/mini-MACS (Md 2.0, n=17) for IPTM as compared with the pre-MACS/mini-MACS (Md 3.0, n=17), z= - 0.541, p=0.589 with a high effect size of r = 0.090. Also, that of GPTM had the same outcome with no significant change in post MACS/mini-MACS (Md 4.0, n=23) as compared with the pre-MACS/mini-MACS (Md 4.0, n=23), z= - 1.511, p=0.131 (p> 0.05) with an effect size of r= 0.223 (refer to Table 4.7).

Gross Motor Functional Measure-88 (GMFM-88)

Results of the various dimensions was not normally distributed. There was a significant difference in the post Total Dimensions % (Md=19.9, n=17) as compared with pre–Total Dimension % (Md=23.3, n=17), z=2.911, p= 0.004, r =0.5 while results from GPTM had a similar outcome of a significant difference in the post-Total Dimension % (Md=26.9, n=23) as compared with pre-Total Dimension % (Md=21.1, n=23), z=3.589, p=0.000, r =0.5. Findings are futher explained in Table 4.7.

Generally, results obtained follow the same trend in both treatment models, that is, Total dimensions % scores showed a significant difference in pre and post Total dimension % scores in GMFM-88 outcome. Detailed results of each dimension revealed, a significant difference in Dimensions B% and C% for IPTM while GPTM, had a significant difference in Dimensions A% (see Table 4.7).

Table 4. 7: Comparison of functional outcomes across the GMFM-88, GMFCS E & R and MAC/mini-MAC levels between the ITM and GTM.

	IPTM **(n = 17)**			GPTM **(n = 23)**			**Total sample (n = 40)**		
	Pre (%)	**Post (%)**	**p-value**	**Pre (%)**	**Post (%)**	**p-value**	**Pre (%)**	**Post (%)**	**p-value**
GMFCS E&R									
Level I	0	5.9	0.131	0	0	1.000	0	2.5	0.333
Level II	13.6	11.8		14.3	8.7		14.0	10.0	
Level III	22.7	23.5		17.9	26.1		35.7	25.0	
Level IV	27.3	29.4		32.1	34.8		30.0	32.5	
Level V	36.4	29.4		35.7	30.4		36.0	30.0	
MACS/ min-MACS levels									
Level I	13.6	29.4	0.589	21.4	30.4	0.157	18.0	30.0	0.258
Level II	27.3	23.5		7.1	0		16.0	10.0	
Level III	22.7	5.9		7.1	13.0		14.0	10.0	
Level IV	9.1	17.6		21.4	17.4		16.0	17.5	
Level V	27.3	23.5		42.9	39.1		36.0	32.5	
GMFM-88									
Dimension A, Median	80.4	70.6	0.181	68.6	96.0	0.002	71.6	92.1	0.001
Dimension B, Median	28.3	33.3	0.005	25.0	36.7	0.351	26.7	36.7	0.011
Dimension C, Median	0.0	7.1	0.028	4.8	2.4	0.850	4.8	4.8	0.088
Dimension D, Median	0.0	0.0	0.397	0.0	0.0	0.074	0.0	0.0	0.058
Dimension E, Median	0.0	0.0	0.600	0.0	0.0	0.506	0.0	0.0	0.453
Total dimension, Median	23.3	19.9	0.004	21.1	26.9	0.000	22.2	26.9	0.000

* IPTM-Individual Physiotherapy Treatment Model, GPTM- Group Physiotherapy Treatment Model, n =number of participants, and p-p-value, GMFCS E&R-Gross motor function classification system (Expnded & Revised version), MACS/mini MACS-Manual Ability Classification Sytem/ mini Manual Ability Classification System, GMFM-88-Gross Motor Fumctional Measure -88.

Change in caregiver outcomes within treatment groups.

Analysis of the pre and post data measurements within each treatment model were done for all caregiver outcomes and the following results were obtained.

Modified Caregiver Strain Index (MCSI)

Data obtained from the pre and post MCSI scores of IPTM were was normally distributed with mean scores 16.6(4.1), p=0.505 and 16.8(5.2), p=0.522 respectively. A paired samples t- test indicated there was no significant difference in the MCSI scores with p=0.859, t=-0.181 and df=16 (See Table 4.8).

Data obtained from GPTM with pre and post MCSI scores revealed that the pre MCSI data with mean 20.6(2.9), p=0.058 was normally distributed and the post MCSI data with mean 19.5(4.3), p=0.016) was not normally distributed. There was no significant difference between the two treatment models (pre-Md=21.0, n=17 and post Md=20.0, n=23) with W=95.0, Z=-1.025, p=0.305 and a moderate effect size (r)=0.2 (See Table 4.8).

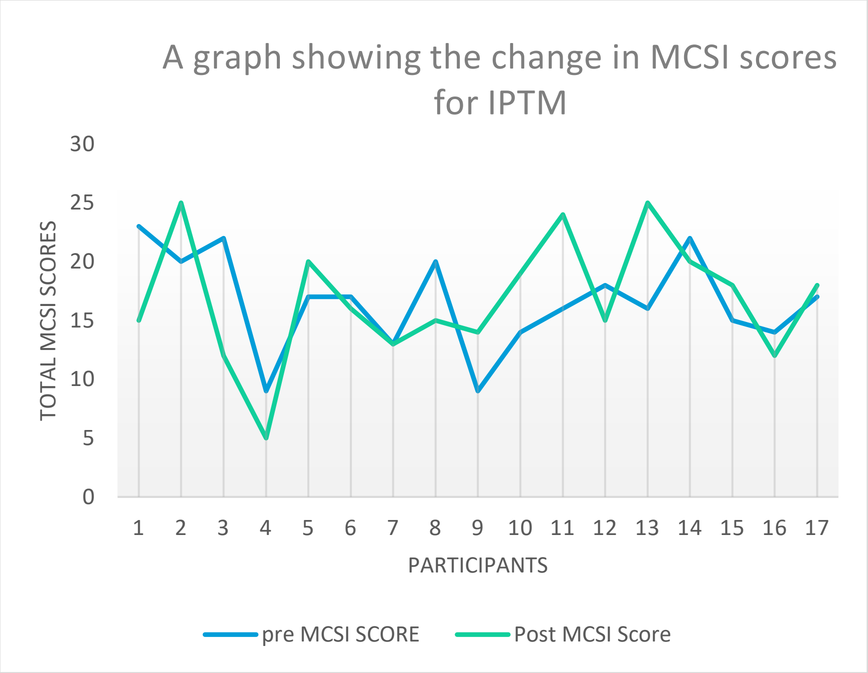

Figure 2: **A line graph of the change in MCSI score for IPTM**.

The graph shows the pre and post results of the MCSI scores over a period of 3 months

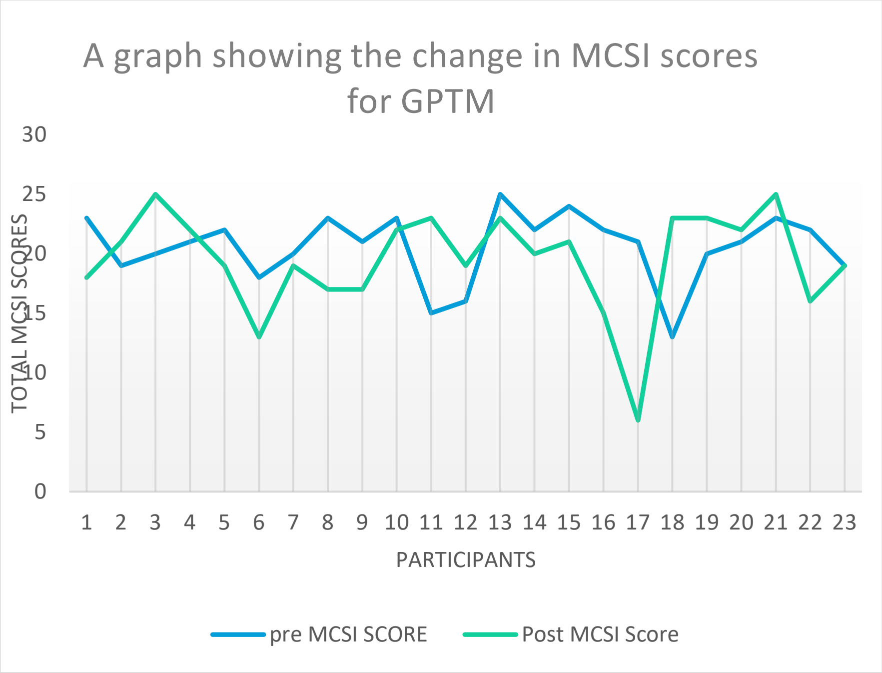

Figure 3: A line graph of the change in MCSI score for GPTM.

The graph shows the pre and post results of the MCSI scores over a period of 3 months.

Health related quality of life (HRQoL)

Data obtained for the pre and post VAS scores of HRQoL from IPTM were normally distributed with mean scores, 72.4(16.8) with p=0.267 and 65.3(13.3) with p=0.067 respectively (refer to Table 4.8). There was no significant difference between mean score with p-value (p=0.097), t= 1.765 and df=16. Figure 4 shows the **HRQoL** scores of each participant before and after 3-months from participants from IPTM. The higher the VAS scores, the better the caregivers state of health.

Again, data obtained for pre and post VAS scores of HRQoL from GPTM, were normally distributed with mean scores, 70.7(21.1) with p=0.124 and 58.3(19.5) with p=0.191 respectively (refer to Table 4.8). There was a significant difference between mean score with p-value (p=0.016), t= 2.606 and df=22 (see Figure 5).

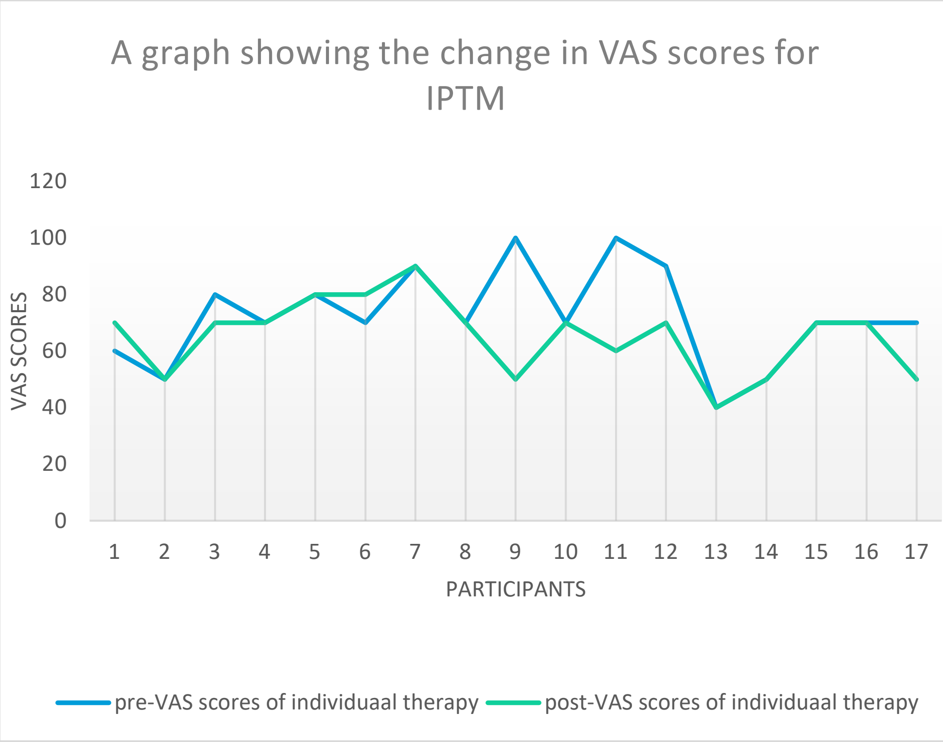

Figure 4: A line graph of the change in VAS scores for IPTM.

The graph shows the pre and post results of the VAS scores over a period of 3 months.

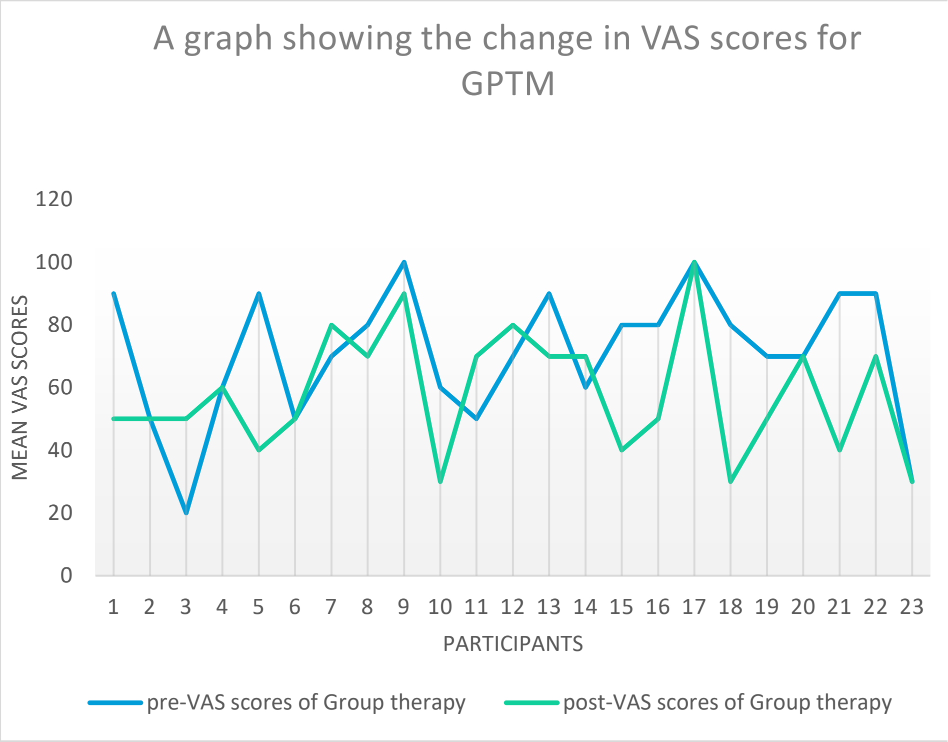

Figure 5: **A line graph of the change in VAS scores for GPTM**.

The graph shows the pre and post results of the VAS scores over a period of 3 months.

Medrisk Satisfaction

Here, a 5-point Likert scale analysis was used to describe pre and post MRPS (refer to Table 4.8). The MedRisk Satisfaction data obtained was not normally distributed and the results indicated no significant difference in pre and post Satisfaction responses for the **IPTM** with W=26.0, Z=-1.366, p=0.172 and an effect size of r =0.2. Figure 6 shows the mean satisfaction scores of each participant before and after 3-months from participants from IPTM. However, participants 2,4,7 and 9 had low mean satisfaction scores after 3months while participants 11,13 and 16 had a high mean satisfaction score after 3 months.

Data obtained was not normally distributed and results indicated a significant difference in pre and post Satisfaction responses for the **GPTM** with W=167.0, Z=2.906, p=0.004 and a moderate effect size of r =0.4. Figure 7 shows the mean satisfaction scores of each participant before and after 3-months from participants from IPTM. However, participants 2,4,6,7,8,9,10,11,12,14,15,18 and 19 had high mean satisfaction scores after 3months, participants 20 and 22 low mean satisfaction scores while participants 1,3,5,16,21 and 23 had no change in their mean satisfaction score after 3 months. This shows that GPTM had more participants who were satisfied after 3- months of treatment.

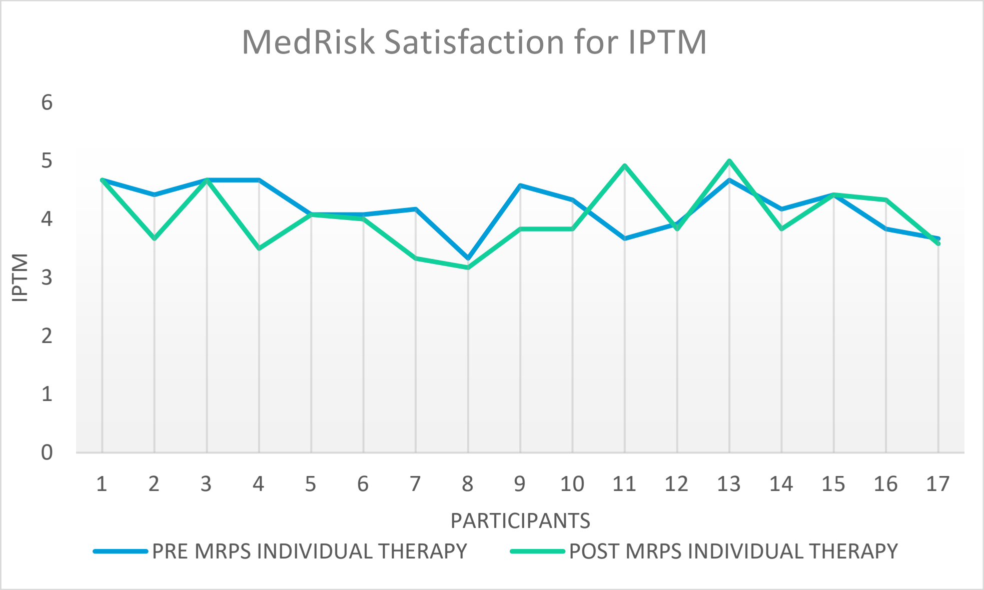

Figure 6: A line graph of the change in mean satisfaction scores for IPTM.

The graph shows the pre and post results of the MedRisk Satisfaction for each participant over a period of 3 months.

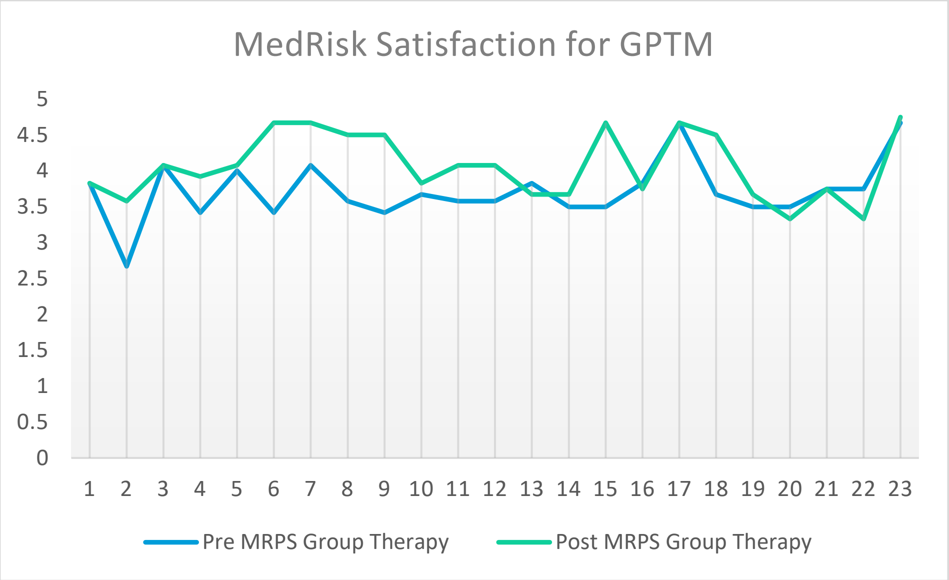

Figure 7: A line graph of the change in mean satisfaction scores for GPTM.

The graph shows the pre and post results of the Medrisk Satisfaction for each participant from GPTM over a period of 3 months.

Table 4. 8: Comparison of caregiver outcomes within groups

MCSI	Pre	Post	statistic	p-value
IPTM, n=17				
Mean (SD)	16.6(4.1)	16.8(5.2)	t= -0.181, df=16	0.859
GPTM, N=23				
Median	21.0	20.0	W=95, Z=-1.025, r = 0.2	0.305
	Pre	**Post**	**statistic**	**p-value**
VAS scores of HRQoL				
IPTM, N=17	72.4(16.8)	65.3(13.3)	t=1.765, df=16	0.097
GPTM, N=23	70.7(21.1)	58.3(19.5)	t= 2.606 df=22	0.016
	Pre	**Post**	**statistic**	**P-value**
Medrisk Satisfaction				
IPTM, N=17				0.172
Median	4.2	3.8	W=26.0, Z=-1.366, r =0.2	
GPTM, N=23				
Median	3.7	4.1	W=167.0, Z=2.906, r= 0.4	0.004

* IPTM-Individual Physiotherapy Treatment Model, GPTM- Group Physiotherapy Treatment Model, MCSI- Modified Care giver Strain Index, VAS scores of HRQoL- Visual Analogue Scale of Health Related Quality of Life, U -Mann Whitney U test, df – degree of freedom, t- independent samples t test, r- effect size, χ 2- Pearson's chi square test, r-effect size, W- Wilcoxon W, Z- Z score or standardized test, mean (SD)-mean (standard deviation) and p-p-value.

4.6 Attendance Analysis

After the three-month period, a total 40 participants came for post measurements their overall attendance have been shown in the table below. Any time they attendended treatment, their attendance was noted. Participants were expected to have attended 12 sessions within the three-month period. The figure 8 below shows the frequencies of attendance of each participant from both treatment model. From the table below, n (2) participants (11.8%) from the individual and n (13) participants (56.5%) from the group treatment model were able to attend at least half of the expected 12 sessions. Figure 15 and 16 is a graphical representation of each participant from individual and group treatment models respectively. The graphs show a high attendance of participants from GPTM as compared to IPTM.

The total Mean (SD) number of therapy sessions attended by the two treatment groups N (40) was 5(3) where Mean attendance for IPTM was 3.3(1.7) and that of GPTM was 6.3(2.5) refer to Table 4.9.

Comparing attendance of IPTM vs GPTM

The attendance data obtained was normally distributed with p values (p=0.119 and p=0.518) for individual and group therapt treatment models respectively. Reults obtained indicated a significant difference between the two groups (with means (SD) 3.3(1.7) IPTM and 6.3(2.5) GPTM), p=0.000, df=37.9 (* if equal variances are not assumed). When both graphs were compared, figure 9, it is reveals that the attendance of participants from the GPTM was higher as compared to IPTM.

Table 4. 9: Comparison of attendance between treatment models

Group Statistics					
	Groups	N	Mean	Std. Deviation	Std. Error Mean
Groups	IPTM	17	3.2941	1.72354	0.41802
	GPTM	23	6.3043	2.49426	0.52009

* IPTM-Individual Physiotherapy Treatment Model, GPTM- Group Physiotherapy Treatment Model N-total number of prticipants, Std. Deviavation- Standard Deviation, Std. Error Mean-Standard Error Mean.

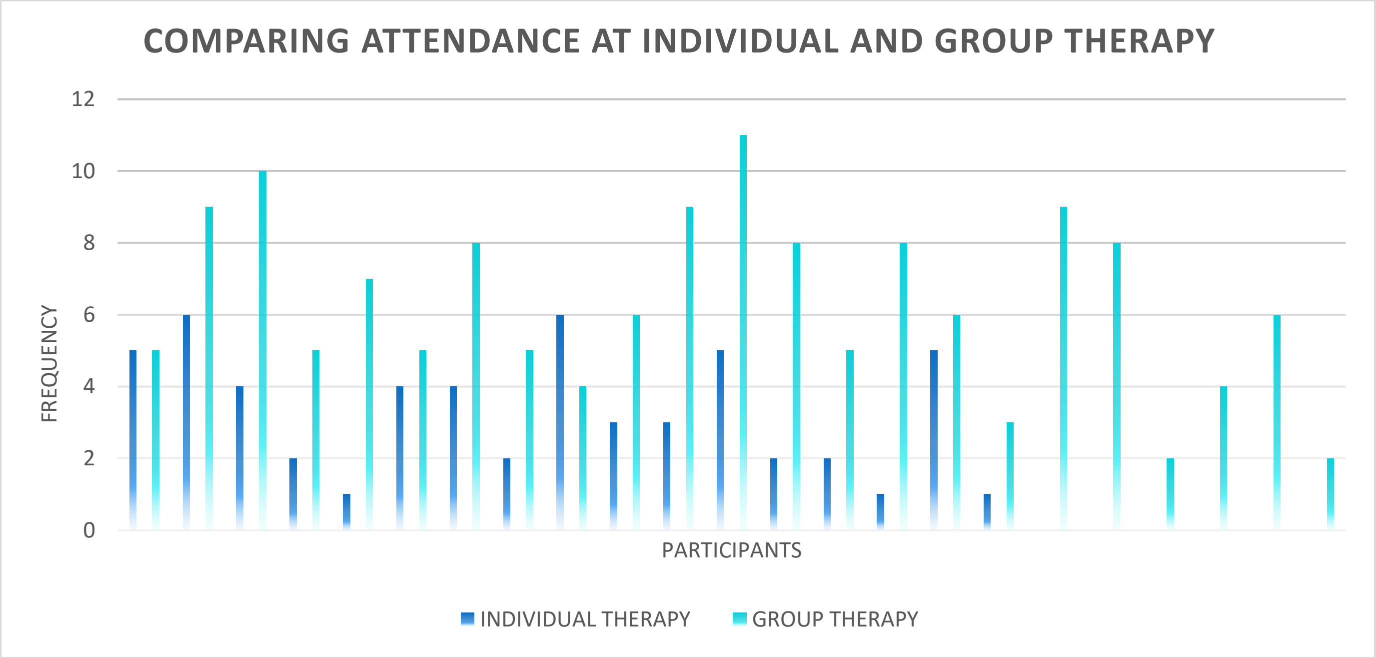

Figure 8: A graph comparing attendance from the two groups.

This image shows the attendance of participants after the three-month treatment period.

Chapter 5: Discussion

5.1 Overview of study

This study used the quasi-experimental design to compare individual and group physiotherapy treatment models for children with SCP. The main objectives of the study were to describe the demographics of the children and their caregivers; compare the functional and caregiver outcomes at pre and post physiotherapy treatment and finally compare the differences within treatment models over a three-month period in the IPTM and GPTM. Additionally, attendance of the caregivers to physioctherapy sessions were also monitored. A total sample of Forty (n = 40) children with spastic cerebral palsy (SCP) took part in the study, along with their respective caregivers. Out of the total, 17 had IPTM, at the same time, 23 had GPTM.

5.2 Functional outcomes

Comparisoms of functional outcomes revealed no significant difference in the IPTM and GPTM at both baseline and endline. The IPTM had significant changes in the total dimension including dimensions B and C while those from the GPTM also had significant changes in the total dimensions including dimensions A and B. Studies have shown that the total dimension score of the GMFM-88 is often used in investigating the effect of various interventions on function of children with CP (Boyd & Hays, 2001; Findlay et al., 2015; Nordmark et al., 2000; Russell & Gorter, 2005). Therefore, we considered only the results obtained for the total dimension scores for this study. Both treatment models showed significant improvement in the total dimension of GMFM-88 for the intra-group comparisms over the three-month period. In a similar study by Lee and collagues, where the GMFM-88 score was used for comparing the functional outcomes of children with moderate to severe degrees of bilateral SCP, a significant improvement in the functioning of the children was seen (Lee et al., 2015). This corresponds to the results from the study which revealed a significant improvement in function (the Total dimension of GMFM-88) using the two treatment models. Furthermore, their study also compared intensive in-patient therapy to out-patient based therapy, where they identified that administering intensive in-patient physical therapy at a younger age improves functional outcomes (Lee et al., 2015). These findings align with the current study since majority of the children from both treatment models were younger and had imporved functional outcomes.

Comparisms of the results obtained for the GMFCS E&R and MACS/mini-MACS showed there was no significant difference within and between treatment models. Salavati and colleagues revealed that grouped task-oriented therapy is effective in enhancing social and motor function (gross and fine) of children with SCP (Salavati et al., 2017). A significant improvement in the GMFM-88 is correlated with a reduced burden of care, however, after three months of physiotherapy intervention, the caregivers were had similar burden of care which showed no significant difference within models. In addition, both treatment models had a significant difference in their GMFM-88 scores. This can also mean that that long-term caregiving leads to stress on the caregivers (Dambi & Jelsma, 2014; Sonune et al., 2021). This provides insight to the fact that there is a need to design an intervention that reduces the burden on the caregiver, which later affects the child's functions and prognosis (Raina et al., 2004; Sankombo, 2022). Caregivers need additional support not only financial, but as a whole systemic or structural support system which begins with the immediate family, followed by the relatives, community and finally the government (Zuurmond et al., 2019).

Significant change in physical attributes and the manual ability of the children was not observed because CP is a chronic condition. However, it was observed that there was a significant change in the GMFM-88 within each treatment model over the three-month period. A study by Russell and Gorter (2005), explained that the GMFM-88 outcome is sensitive to exposing minor functional changes over time, while the GMFCS E & R outcome can detect major changes in function. This explains why the current study found no significant change in the GMFCS E&R and MACS levels. Therefore, minor changes in the GMFCS E & R and MACS levels will not reduce the burden of care among caregivers. This implies that both treatment models had the same desired outcomes functionally. Currently, research on the comparisms between individual and grouped physiotherapy treatment models is limited.

5.3 Caregiver outcomes

No significant difference in the caregiver outcomes were seen between the models before and after treatment. Currently, there is limited knowledge on the burden of care for individual and grouped physiotherapy treatment models. The current study addresses this gap by providing evidence-based information on the trends of functional and caregiver outcomes by comparing the IPTM and GPTM.

The results of the current study for within group comparism showed improved attendance of physiotherapy sessions and satisfaction from caregivers from the GPTM. This could be explained by the fact that GPTM allows for patients to gain support from one another, as well as learn from the experiences of other group members which may be beneficial to those dealing with mental health issues (Zuurmond et al., 2019). Several studies have shown that a high burden of care as a result of long term caregiving, has a negative impact on the quality of life of caregivers (Fonzi et al., 2021; Liu et al., 2023; Vadivelan et al., 2020). The pre-MCSI scores mean GPTMfor the GPTM was higher than that of IPT. The same pattern was observed for the post-MCSI mean scores. Similarly, intra-group analysis of each treatment model revealed no significant difference. In a study to compare the impact of community and hospital-based treatment of CP, the study concluded that long term caregiving increases the burden of care. A recommendation on designing a treatment to alleviate the burden was given (Dambi & Jelsma, 2014).

Intra-group analysis of the VAS scores of HRQoL and the MRPS with physical therapy showed a significant difference for GPTM. Eventhough, results for the VAS scores of HRQoL indicated a significant difference between pre and post outcome, the with reduced mean value for the post VAS Score. This reveals that caregivers participating in GPTM had a reduced state of health from the burden of caregiving. This was due to the fact that the children from the GPTM model were older with most of them at level V of the GMFCS E&R as compared to those from IPTM who were younger with similar GMFCS E&R at level V. More effort is required from the caregiver in managing these children on a daily basis hence, a higher burden of care and low VAS score on the HRQoL is seen. Intragroup Comparism for IPTM, showed no significant difference for all the caregiver outcomes and this is notworthy. Implying this treatment model offers only functional benefits with limited benefits for the caregivers.

The level of impairement is associated with the independence, mobility, HRQoL, burden of care and social integration of the child and families. Therapies targeted at improving factors such as the forementioned, may improve the HRQoL (Surender et al., 2016). Recently, it was reported that caregivers stress and anxiety levels are related to the child's level of dependency and problems associated with long term caregiving, which has a direct negative impact on the mental health of the caregiver (Kouther et al., 2022). Aydin and Nur (2012) explained that families of children with CP are faced with a number of challenges which include family dysfuntion, psychological stress and social segregation. These findings are similar to that of Ghana, where obstacles such as social stigmatization and superstitious beliefs were identified as barriers to achieving a family centered approach (Kyerematenq et al., 2019a; Nyante & Carpenter, 2019). Caregivers of children with CP suffer from social stigmatization from close family members and communities (Keforilwe & Smit, 2021; Vadivelan et al., 2020b; Zuurmond et al., 2019). This extrinsic factor may affect the social support needed for the caregivers of children with CP. Health care professionals should consider early interventions with proactive measures which are aimed at providing family centered care and social support.

In Ghana, children with CP often face a lack of social integration (Nyante & Carpenter, 2019; Zuurmond et al., 2018). Studies have shown that successful integragation can only be possible with family and social support. This is evident in low resourced settings, where there is an obvious lack of community and government support for children with CP (Hunt et al., 2022; Magnusson et al., 2019). However, in high resource countries, caregivers benefit from monthly stipends in taking care of their children (Oguntade et al., 2022). Additonally, caregivers from these countries benefit, since early detection of CP is a major policy in their health care systems, therefore children who are diagnosed with CP receive immediate individualized treatment. In low economic areas however, there is a need for group treatment and care in order to promote social support for children with CP and their caregivers (Ozturk et al., 2019). Low socio-economic areas have reduced resources and knowledge regarding CP and may benefit from the GPTM to mitigate the challenges they face (Nyante & Carpenter, 2019; Zuurmond et al., 2018, 2019).

There were no signifant differences in functional and caregiver outcomes between the two treatment models during the initial and subsequent intervention periods, apart from a noteworthy variance in the pre-VAS scores of HRQoL between groups when comparing IPTM and GPTM. Results obtained from intra-group comparisons showed significant variations. For the GTM, there were significant differences observed in the total dimension score of GMFM-88, VAS scores of HRQoL and MPRS. In contrast, for the IPTM, a significant difference was only observed in the total dimension score of GMFM-88. These findings indicate a clear improvement in the GMFM-88 scores for both treatment models, suggesting their potential effectiveness in enhancing functionality among children with cerebral palsy. Neither the GMFCS E&R nor the MACS displayed any significant alterations in pre-treatment and post-treatment phases, nor did they exhibit any notable changes within the respective groups.

With regards to the caregiver outcomes, of GPTM, there was a significant decrease in the VAS scores of HRQoL. Despite this decrease, caregivers of the GPTM were satisfied with their physical therapy sessions as they had a better attendance to physical therapy sessions when compared to the the cargivers from IPTM. This could potentially be due to increseased social interaction and support the caregivers experiencing as a result of particapting in the GPTM. Similar results were reported in a recent study which compared the effect of group verse individual exercises on balance, gross motor function and participation of children with spastic diplegic CP (Jose & Wasnik, 2022). The authors indicated that group exercises produced better outcomes in function and participation of the children, as compared to individual exercises (Jose & Wasnik, 2022). This suggests that children who participatein GPTM sessions engage more in social interactions, which may contribute to improved motivation and overall interventional outcomes. In another study which investigated the effectiveness of individual and group physiotherapy on sub-acromial impingement management, it was reported that the group cohort had produced similar clinical outcomes to that of the individual cohort (Ryans et al., 2020) which is inline with the current study.

There exists a gap in literature with regards to comparing individualized and group physiotherapy treatment models for CP rehabilitation. In Ghana, research is focused on qualitative studies of caregivers and quantitative research outcomes of treatment on the function of children with CP are scarce (Andah, 2023; Kyeremateng et al., 2019; Nyante & Carpenter, 2019; Oguntade et al., 2022). GPTM provides a cost-efficient method of treatment for children with CP, as fewer trained professionals are required to provide treatment to a larger number of patients (Deblinger et al., 2016). This can be very advantageous in areas that have a very low therapist to patient ratio, such as Ghana. A studies onconfimed the fact that caregivers of children with cerebral palsy face a lot of challenges which can be limited by designing treatment sessions that produce beneficial outcomes (Nyante & Carpenter, 2019; Andah 2023). These outcomes should not be only focused on the functional outcomes of the child but also on the indirect effect it has on the caregiver (Raina et al., 2005). Outcomes such as the burden of care, the health-related quality of life of the caregiver and the caregiver’s satisfaction with physical therapy treatment influence the childs functional improvement (Valdivilan 2020, Fonzi 2021, Ko et al., 2013, Dambi & Jelsma 2014).

5.4 Caregiver demographics

Majority of the caregivers were females (specifically mothers) who were employed (informally). While most of the caregivers of the ITM were married and educated (SHS and tertiary), majority of those from the GPTM were single parents, with a lower level of educational (Senior high school). Despite caregivers of the IPTM being married, there was no significant change in their burden of care over the three-months period. Similarly, most of the caregivers from GPTM were divorced and also did not experience any significant difference in the burden of care. This means that physical therapy treatment whether grouped or individualized has a potential of maintaining the burden of care (Narekuli et al., 2011). Providing extended care for children with CP has an adverse impact on the burden of caregiving, encompassing financial, relational, and social repercussions (Narekuli et al., 2011). This extendend care spans from basic assistance from the caregiver to the nearest family member, community and to the physical therapist. A number of studies report low socio-economic factors like poverty, stigmatization, belief systems and lack of inclusive public policy as hinderances to reduced burden of care for caregiver with children with CP (Vadivelan et al., 2020; Fouad et al., 2022; Liu et al., 2023).

A recent study conducted in Sweden reported that there is no association between parental divorce and having a child with CP, however it was reported that, having a child with CP hightens the risk of deivorce (Müller et al., 2022). In addition, divorced parents with low education are more vulnerable and require additional support (Müller et al., 2022). Due to long term caregiving, caregivers of children with CP often suffer from depression, which may result in other mental health issues. This has a direct impact on families, as this often leads to broken family relationshps and social isolation (Fouad et al., 2022; Menlah et al., 2020).

In high-income countries, there exists a lower correlation between a child's risk of CP and parental socio-economic status, particularly in cases where mothers have a higher level of education and partners (Forthun et al., 2018). However, no association was reported between parental income and the likelihood of a child developing CP (Forthun et al., 2018). In a study conducted in China by Tseng et al., (2018) to find the association between socio-economic status and CP, it was found that there was a higher prevalence of CP in rural areas and families with low income. This indicates that socioeconimc status has an indirect impact on the risk of a child developing CP (Forthun et al., 2018). This is due to several risk factors like poor health systems, the lack of resources to support families that cannot afford proper health care and the lack of structured screening protocols for children with developmental disabilities at early onset (Adei-Atiemo et al., 2015; Karumuna and Mgone, 1990; Ogunlesi et al., 2010).

From the study, caregivers from the GPTM travel an average distance of 28.59km, while those from the IPTM cover an average distance of 13.55km to their various hospitals. Accessability to health care services greatly influences the progress of rehabilitation for children with CP (Andah, 2023). Numerous studies have shown that geographical location determines the patient’s accessibility to quality health care (Andah et al., 2023; Oguntade et al., 2022). In addition to geographical barriers, inadequate health care infrastructure, lack of skilled professionals and poor health care systems are a few factors which those living in rural areas are faced with (Andah, 2023). A study conducted by Jindal et al. (2019), identified a number of factors which contribute to the success of achieving quality health care for children with CP in high income countries. These factors included “political commitment to disability policies, good leadership and governance, health financing, engagement of stakeholders and private sector providers, improved healthcare workforce, physical infrastructure, mordern technologies for diagnosing and health care, systems for improving the quality of care, monitoring and evaluation, and health policy/ systems research" (Jindal et al., 2019).

5.5 Child demographics

Children from the IPTM were younger in comparison to the children from the GPTM. This was due to the difference in geographical locations which were children from IPTM were from the urban area which predisposes them to improved diagnostics and early screening. However, the children from GPTM were found in a semi-rural to rural settings. This naturally predisposes them to poor health systems explained by Andah and colleagues in their literature (Andah et al., 2023). In low and middle income countries, the diagnosis for CP in children is usually done late, at five years of age, while in high income countries the diagnosis is made when the child is between 12 to 24 months old (Te Velde et al., 2019).

The child demographic data obtained from the the two treatment models appeared to be similar which meant it was a true representation of children with SCP. Studies conducted in in Africa have shown similar results in the child demographic information such as male dominance, spastic quadriplegic CP being the commonest type of CP, birth asphyxia as the commonest risk factor and seizure as the predominant comorbidity identified (Adei-Atiemo et al., 2015; Kakooza-Mwesige et al., 2015; Tsige et al., 2021). In Nepal and Uganda quadriplegic SCP is the commonest type of CP diagnosed, and occurs in predominately males (Chaudhary et al., 2022). Earlier studies report a pattern of male predominance in CP was conducted to explore the reason for this trend (Cheshire et al., 2010; Dambi & Jelsma, 2014; Eker & Tüzün, 2004; Moster et al., 2010). To explain this trend, Johnston and Hagberg (2007) revealed that this may be due to the risk of white matter injury and intraventricular haemorrhage in pre-term males during the early stages of development (Johnston & Hagberg, 2007).

The study also observed prevalent risk factors among children diagnosed with CP. These risk factors include birth asphyxia, delayed delivery or prolonged labor, low birth weight, pre-eclampsia, infections, neonatal jaundice, and prematurity. These findings are confirmed in previous studies on children with CP of African ancestry, with most of the risk factors identified preventable (Adei-Atiemo et al., 2015; Donald et al., 2014b; Ogoke & Ogoke, 2022). Risk factors for CP diagnosis in low income countires may be due to inadeaquate health care systems, leading to the inability to detect CP in the early stages of life (Adei-Atiemo et al., 2015; Adomako, 2017; Tumulty, 2010).

Numerous comorbidities were identified from both treatment models, which included difficult in feeding and swallowing, respiratory complications and seizures. Seizures was the most prevelant comorbidity, identified from both treatment models. Previous studies on CP report seizures to be the most widely identified comorbidity (Donald et al., 2014; Duke et al., 2021; Kakooza-Mwesige et al., 2015; Ogunlesi et al., 2010). Uncontrolled seizures may lead to speech, motor and cognitive impairment, which disrupts the process of rehabilitation. Therefore there is an need for early management of CP by involving other members of a multidisciplinary team such as physiotherapists, occupational therapists, speech therapists (Autti-Ramo et al., 2006; Blackmore et al., 2007; Donald et al., 2014; El-Tallawy et al., 2014; Snider et al., 2011).

5.6 Caregiver's attendance to physical therapy

Caregivers from the GPTM had better compliance in attendance of physiotherapy sessions. A total of 56.5% of the caregivers from the GPTM were able to attend at least half of the expected 12 sessions, in comparison to 11.8% from the IPTM group. Factors such as travelling distance, high cost of treatment, poor family and social support; and lack of understanding of CP and its treatments are major influencing factors in the compliance of treatment (Biwott, 2014). Certain sociodemographic factors greatly influence caregiver adherence to physiotherapy, such as level of education, marital status, knowledge of the condition and socio-economic status. Caregivers who are married, have a high level of education, with adequate knowledge of CP and are within the upper socio-economic class, are reported to have a high adherence to therpy sessions (Usman et al., 2017). The caregiver's lack of CP knowledge after diagnosis is indisputable therefore, healthcare professionals need to offer their support to caregivers through intermittent education, in the form of workshops and implementing home follow-up services (Zuurmond et al., 2018).

Other factors such as distance, high transportation and treatment cost, changes in treatment schedules and the health of both the child and caregiver, can greatly influence attendance to therapy. Being apart of a group relieves the caregivers of the psychological and physical burden of caregiving since caregivers in similar situations are treated together, creating a sense of community (Moriwaki et al., 2022).

Chapter 6: Conclusion

The study sample consisted of children with SCP only and it was identified as the most common form of CP at the Korle-bu and Ho Teaching Hospitals. No significant difference between the ITM-HA and GTM-HB was observed for functional outcomes of children with CP and their respective caregivers' burden of care, quality of life and satisfaction with treatment at pre and post treatment. However, intra group comparisms showed a significant difference in total dimension scores GMFM-88 for both IPTM and GPTM. There was a significant difference in the VAS scores of HRQoL and mean MRPS scores for GPTM while IPTM had no significant diference in caregiver outcomes within models. This could be due to the small sample size, study duration and limited study sites. A longer duration period for the intervention, increased sample size and multiple site testing for both treatment models may have produced different result outcomes.

There were higher attendance rates in the GTM-HB due to the social support most of the caregivers reported they gained from being a part of a group. The GPTM can be recommended for caregivers who are having difficulty with accepting their childs diagnosis as it offers a certain level of emotional and social support (Prest et al., 2022; Zuurmond et al., 2018).

There is a great burden of care on the cargeivers of children with CP in Ghana. This has an indirect impact on the economy as caregivers are essential to the economic development of a country and in many cases may have to leave their form of employment in order to care for their children (Manyuma et al., 2023; Sankombo, 2022~~)~~; Bian et al., 2022; Olawale et al., 2013).

A comprehensive management plan for CP children in Ghana, which includes the caregivers and the burden of care should be considered. Physiotherapists that are being trained in order to effectively treat children with CP in Ghana are key role players and therefore they must understand the importance of early intervention for CP. It is also important for physiotherapists to educate the family on CP, due to the superstitious beliefs and social stigmatiztion that exists with respect to CP in Ghana. Providing the family with CP education and recommendations for support lines will not only assist in alleviating stress the caregivers may experience, but will also encourage the family to support each other. Family health promotion programs in the communities or awareness campaigns to reduce the social stigmatization will alleviate some emotional stress amongst caregivers

Additonally, government and stakeholders should consider allocating resources to major rural areas which lack the proper medical care infrastructure, with the primary aim of improving health care service delivery. The government needs to look at ways of implementing policies for a successful integration into the society. Programs like inclusive education for children with a considerable level of intellectual and functional ability should be followed vehemently by the Ghana education system. This can be done by providing monthly stipends to caregivers and offering free health insurance for children with CP to make health care more accessible.

Limitations and methodological shortfalls were identified from the study. Firstly, in terms of the quasi-experiment approach there was lack of randomization. This may be limiting in using findings as a general phenomenon since samples were not randomized and multiple centers were not used for the research. Secondly, the researcher and research assistant were not blinded, therefore there may be the possibility of biases. Lastly, a control group was not included. Despite these limitations, quasi-experimental methods offer options for conducting experiments in natural settings since there are no manipulations in the child's usual treatment. It can also be used as a tool for observing effect of a particular treatment or modality.

Overall, the study provided some insight into the benefits of physical therapy in managing spastic cerebral palsy. Also, therapist can choose which type of model they find fit for a particular setting. The study gave insight on the sensitivity of GMFM-88 at both Hospitals within a period of 3-months. Further studies could focus on using randomized controlled trials and multi-centre studies, functional outcomes. Further studies should also explore quantitative research in children with other forms of CP will aid in identifying differences in the challenges faced by both the children and their caregivers.

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APPENDIX 1: GROSS MOTOR FUNCTION CLASSIFICATION SYSTEM – EXPANDED AND REVISED (GMFCS – E & R)

LEVEL I: Infants move in and out of sitting and floor sit with both hands free to manipulate objects. Infants crawl on hands and knees, pull to stand and take steps holding on to furniture. Infants walk between 18 months and 2 years of age without the need for any assistive mobility device.

LEVEL II: Infants maintain floor sitting but may need to use their hands for support to maintain balance. Infants creep on their stomach or crawl on hands and knees. Infants may pull to stand and take steps holding on to furniture.

LEVEL III: Infants maintain floor sitting when the low back is supported. Infants roll and creep forward on their stomachs.

LEVEL IV: Infants have head control but trunk support is required for floor sitting. Infants can roll to supine and may roll to prone.

LEVEL V: Physical impairments limit voluntary control of movement. Infants are unable to maintain antigravity head and trunk postures in prone and sitting. Infants require adult assistance to roll.

BETWEEN 2ND AND 4TH BIRTHDAY

LEVEL I: Children floor sit with both hands free to manipulate objects. Movements in and out of floor sitting and standing are performed without adult assistance. Children walk as the preferred method of mobility without the need for any assistive mobility device.

LEVEL II: Children floor sit but may have difficulty with balance when both hands are free to manipulate objects. Movements in and out of sitting are performed without adult assistance. Children pull to stand on a stable surface. Children crawl on hands and knees with a reciprocal pattern, cruise holding onto furniture and walk using an assistive mobility device as preferred methods of mobility.

LEVEL III: Children maintain floor sitting often by "W-sitting" (sitting between flexed and internally rotated hips and knees) and may require adult assistance to assume sitting. Children creep on their stomach or crawl on hands and knees (often without reciprocal leg movements) as their primary methods of self-mobility. Children may pull to stand on a stable surface and cruise short distances. Children may walk short distances indoors using a hand-held mobility device (walker) and adult assistance for steering and turning.

LEVEL IV: Children floor sit when placed, but are unable to maintain alignment and balance without use of their hands for support. Children frequently require adaptive equipment for sitting and standing. Self-mobility for short distances (within a room) is achieved through rolling, creeping on stomach, or crawling on hands and knees without reciprocal leg movement.

LEVEL V: Physical impairments restrict voluntary control of movement and the ability to maintain antigravity head and trunk postures. All areas of motor function are limited. Functional limitations in sitting and standing are not fully compensated for through the use of adaptive equipment and assistive technology. At Level V, children have no means of independent movement and are transported. Some children achieve self-mobility using a powered wheelchair with extensive adaptations.

BETWEEN 4TH AND 6TH BIRTHDAY

LEVEL I: Children get into and out of, and sit in, a chair without the need for hand support. Children move from the floor and from chair sitting to standing without the need for objects for support. Children walk indoors and outdoors, and climb stairs. Emerging ability to run and jump.

LEVEL II: Children sit in a chair with both hands free to manipulate objects. Children move from the floor to standing and from chair sitting to standing but often require a stable surface to push or pull up on with their arms. Children walk without the need for a handheld mobility device indoors and for short distances on level surfaces outdoors. Children climb stairs holding onto a railing but are unable to run or jump.

LEVEL III: Children sit on a regular chair but may require pelvic or trunk support to maximize hand function. Children move in and out of chair sitting using a stable surface to push on or pull up with their arms. Children walk with a hand-held mobility device on level surfaces and climb stairs with assistance from an adult. Children frequently are transported when traveling for long distances or outdoors on uneven terrain.

LEVEL IV: Children sit on a chair but need adaptive seating for trunk control and to maximize hand function. Children move in and out of chair sitting with assistance from an adult or a stable surface to push or pull up on with their arms. Children may at best walk short distances with a walker and adult supervision but have difficulty turning and maintaining balance on uneven surfaces. Children are transported in the community. Children may achieve self-mobility using a powered wheelchair.

LEVEL V: Physical impairments restrict voluntary control of movement and the ability to maintain antigravity head and trunk postures. All areas of motor function are limited. Functional limitations in sitting and standing are not fully compensated for through the use of adaptive equipment and assistive technology.

At Level V, children have no means of independent movement and are transported. Some children achieve self-mobility using a powered wheelchair with extensive adaptations.

BETWEEN 6TH AND 12TH BIRTHDAY

Level I: Children walk at home, school, outdoors, and in the community. Children are able to walk up and down curbs without physical assistance and stairs without the use of a railing. Children perform gross motor skills such as running and jumping but speed, balance, and coordination are limited. Children may participate in physical activities and sports depending on personal choices and environmental factors.

Level II: Children walk in most settings. Children may experience difficulty walking long distances and balancing on uneven terrain, inclines, in crowded areas, confined spaces or when carrying objects. Children walk up and down stairs holding onto a railing or with physical assistance if there is no railing. Outdoors and in the community, children may walk with physical assistance, a hand-held mobility device, or use wheeled mobility when traveling long distances. Children have at best only minimal ability to perform gross motor skills such as running and jumping. Limitations in performance of gross motor skills may necessitate adaptations to enable participation in physical activities and sports.

Level III: Children walk using a hand-held mobility device in most indoor settings. When seated, children may require a seat belt for pelvic alignment and balance. Sit-to-stand and floor-to-stand transfers require physical assistance of a person or support surface. When traveling long distances, children use some form of wheeled mobility. Children may walk up and down stairs holding onto a railing with supervision or physical assistance. Limitations in walking may necessitate adaptations to enable participation in physical activities and sports including self-propelling a manual wheelchair or powered mobility.

Level IV: Children use methods of mobility that require physical assistance or powered mobility in most settings. Children require adaptive seating for trunk and pelvic control and physical assistance for most transfers. At home, children use floor mobility (roll, creep, or crawl), walk short distances with physical assistance, or use powered mobility. When positioned, children may use a body support walker at home or school. At school, outdoors, and in the community, children are transported in a manual wheelchair or use powered mobility. Limitations in mobility necessitate adaptations to enable participation in physical activities and sports, including physical assistance and/or powered mobility.

Level V: Children are transported in a manual wheelchair in all settings. Children are limited in their ability to maintain antigravity head and trunk postures and control arm and leg movements. Assistive technology is used to improve head alignment, seating, standing, and and/or mobility but limitations are not fully compensated by equipment. Transfers require complete physical assistance of an adult. At home, children may move short distances on the floor or may be carried by an adult. Children may achieve self-mobility using powered mobility with extensive adaptations for seating and control access. Limitations in mobility necessitate adaptations to enable participation in physical activities and sports including physical assistance and using powered mobility.

BETWEEN 12TH AND 18TH BIRTHDAY

Level I: Youth walk at home, school, outdoors, and in the community. Youth are able to walk up and down curbs without physical assistance and stairs without the use of a railing. Youth perform gross motor skills such as running and jumping but speed, balance, and coordination are limited. Youth may participate in physical activities and sports depending on personal choices and environmental factors.

Level II: Youth walk in most settings. Environmental factors (such as uneven terrain, inclines, long distances, time demands, weather, and peer acceptability) and personal preference influence mobility choices. At school or work, youth may walk using a handheld mobility device for safety. Outdoors and in the community, youth may use wheeled mobility when traveling long distances. Youth walk up and down stairs holding a railing or with physical assistance if there is no railing. Limitations in performance of gross motor skills may necessitate adaptations to enable participation in physical activities and sports. Level III: Youth are capable of walking using a hand-held mobility device. Compared to individuals in other levels, youth in Level III demonstrate more variability in methods of mobility depending on physical ability and environmental and personal factors. When seated, youth may require a seat belt for pelvic alignment and balance. Sit-to-stand and floor-to-stand transfers require physical assistance from a person or support surface. At school, youth may self-propel a manual wheelchair or use powered mobility. Outdoors and in the community, youth are transported in a wheelchair or use powered mobility. Youth may walk up and down stairs holding onto a railing with supervision or physical assistance. Limitations in walking may necessitate adaptations to enable participation in physical activities and sports including self-propelling a manual wheelchair or powered mobility.

Level IV: Youth use wheeled mobility in most settings. Youth require adaptive seating for pelvic and trunk control. Physical assistance from 1 or 2 persons is required for transfers. Youth may support weight with their legs to assist with standing transfers. Indoors, youth may walk short distances with physical assistance, use wheeled mobility, or, when positioned, use a body support walker. Youth are physically capable of operating a powered wheelchair. When a powered wheelchair is not feasible or available, youth are transported in a manual wheelchair. Limitations in mobility necessitate adaptations to enable participation in physical activities and sports, including physical assistance and/or powered mobility.

Level V: Youth are transported in a manual wheelchair in all settings. Youth are limited in their ability to maintain antigravity head and trunk postures and control arm and leg movements. Assistive technology is used to improve head alignment, seating, standing, and mobility but limitations are not fully compensated by equipment. Physical assistance from 1 or 2 persons or a mechanical lift is required for transfers. Youth may achieve self-mobility using powered mobility with extensive adaptations for seating and control access. Limitations in mobility necessitate adaptations to enable participation in physical activities and sports including physical assistance and using powered mobility.

APPENDIX 2: GROSS MOTOR FUNCTION MESURE (GMFM-88).

GROSS MOTOR FUNCTION MEASURE (GMFM)
SCORE SHEET (GMFM-88 and GMFM-66 scoring)

Child's Name: ______________________________ ID#: ____________________

Assessment Date: ____________________ year / month / day

GMFCS Level[1]: ☐ I ☐ II ☐ III ☐ IV ☐ V

Date of Birth: ____________________ year / month / day

Chronological Age: ____________________ year / month / day

Evaluator's Name: ____________________

Testing Condition (e.g., room, clothing, time, others present):

____

The GMFM is a standardized observational instrument designed and validated to measure change in gross motor function over time in children with cerebral palsy. The scoring key is meant to be a general guideline. However, most of the items have specific descriptors for each score. It is imperative that the guidelines contained in the manual be used for scoring each item.

SCORING KEY

0 = does not initiate
1 = initiates
2 = partially completes
3 = completes
9 (or leave blank) = not tested (NT) [used for the GMAE-2 scoring*]

It is important to differentiate a true score of "0" (child does not initiate) from an item which is Not Tested (NT) if you are interested in using the GMFM-66 Ability Estimator (GMAE) Software.

*The GMAE-2 software is available for downloading from www.canchild.ca for those who have purchased the GMFM manual. The GMFM-66 is only valid for use with children who have cerebral palsy.

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[1] GMFCS level is a rating of severity of motor function. Definitions for the GMFCS-E&R (expanded & revised) are found in Palisano et al. (2008). Developmental Medicine & Child Neurology. 50:744-750 and in the GMAE-2 scoring software. http://motorgrowth.canchild.ca/en/GMFCS/resources/GMFCS-ER.pdf

Check (3) **the appropriate score:** if an item is not tested (NT), circle the item number on the right column

	Item	A: LYING & ROLLING	SCORE				NT
	1.	SUP, HEAD IN MIDLINE: TURNS HEAD WITH EXTREMITIES SYMMETRICAL	0☐	1☐	2☐	3☐	1.
*	2.	SUP: BRINGS HANDS TO MIDLINE, FINGERS ONE WITH THE OTHER	0☐	1☐	2☐	3☐	2.
	3.	SUP: LIFTS HEAD 45°	0☐	1☐	2☐	3☐	3.
	4.	SUP: FLEXES R HIP & KNEE THROUGH FULL RANGE	0☐	1☐	2☐	3☐	4.
	5.	SUP: FLEXES L HIP & KNEE THROUGH FULL RANGE	0☐	1☐	2☐	3☐	5.
*	6.	SUP: REACHES OUT WITH R ARM, HAND CROSSES MIDLINE TOWARD TOY	0☐	1☐	2☐	3☐	6.
*	7.	SUP: REACHES OUT WITH L ARM, HAND CROSSES MIDLINE TOWARD TOY	0☐	1☐	2☐	3☐	7.
	8.	SUP: ROLLS TO PR OVER R SIDE	0☐	1☐	2☐	3☐	8.
	9.	SUP: ROLLS TO PR OVER L SIDE	0☐	1☐	2☐	3☐	9.
*	10.	PR: LIFTS HEAD UPRIGHT	0☐	1☐	2☐	3☐	10.
	11.	PR ON FOREARMS: LIFTS HEAD UPRIGHT, ELBOWS EXT., CHEST RAISED	0☐	1☐	2☐	3☐	11.
	12.	PR ON FOREARMS: WEIGHT ON R FOREARM, FULLY EXTENDS OPPOSITE ARM FORWARD	0☐	1☐	2☐	3☐	12.
	13.	PR ON FOREARMS: WEIGHT ON L FOREARM, FULLY EXTENDS OPPOSITE ARM FORWARD	0☐	1☐	2☐	3☐	13.
	14.	PR: ROLLS TO SUP OVER R SIDE	0☐	1☐	2☐	3☐	14.
	15.	PR: ROLLS TO SUP OVER L SIDE	0☐	1☐	2☐	3☐	15.
	16.	PR: PIVOTS TO R 90° USING EXTREMITIES	0☐	1☐	2☐	3☐	16.
	17.	PR: PIVOTS TO L 90° USING EXTREMITIES	0☐	1☐	2☐	3☐	17.
		TOTAL DIMENSION A	☐				

	Item	B: SITTING	SCORE				NT
*	18.	SUP, HANDS GRASPED BY EXAMINER: PULLS SELF TO SITTING WITH HEAD CONTROL	0☐	1☐	2☐	3☐	18.
	19.	SUP: ROLLS TO R SIDE, ATTAINS SITTING	0☐	1☐	2☐	3☐	19.
	20.	SUP: ROLLS TO L SIDE, ATTAINS SITTING	0☐	1☐	2☐	3☐	20.
*	21.	SIT ON MAT, SUPPORTED AT THORAX BY THERAPIST: LIFTS HEAD UPRIGHT, MAINTAINS 3 SECONDS	0☐	1☐	2☐	3☐	21.
*	22.	SIT ON MAT, SUPPORTED AT THORAX BY THERAPIST: LIFTS HEAD MIDLINE, MAINTAINS 10 SECONDS	0☐	1☐	2☐	3☐	22.
*	23.	SIT ON MAT, ARM(S) PROPPING: MAINTAINS, 5 SECONDS	0☐	1☐	2☐	3☐	23.
*	24.	SIT ON MAT: MAINTAIN, ARMS FREE, 3 SECONDS	0☐	1☐	2☐	3☐	24.
*	25.	SIT ON MAT WITH SMALL TOY IN FRONT: LEANS FORWARD, TOUCHESTOY, RE-ERECTS WITHOUT ARM PROPPING	0☐	1☐	2☐	3☐	25.
*	26.	SIT ON MAT: TOUCHES TOY PLACED 45° BEHIND CHILD'S R SIDE, RETURNS TO START	0☐	1☐	2☐	3☐	26.
*	27.	SIT ON MAT: TOUCHES TOY PLACED 45° BEHIND CHILD'S L SIDE, RETURNS TO START	0☐	1☐	2☐	3☐	27.
	28.	R SIDE SIT: MAINTAINS, ARMS FREE, 5 SECONDS	0☐	1☐	2☐	3☐	28.
	29.	L SIDE SIT: MAINTAINS, ARMS FREE, 5 SECONDS	0☐	1☐	2☐	3☐	29.
*	30.	SIT ON MAT: LOWERS TO PR WITH CONTROL	0☐	1☐	2☐	3☐	30.
*	31.	SIT ON MAT WITH FEET IN FRONT: ATTAINS 4 POINT OVER R SIDE	0☐	1☐	2☐	3☐	31.
*	32.	SIT ON MAT WITH FEET IN FRONT: ATTAINS 4 POINT OVER L SIDE	0☐	1☐	2☐	3☐	32.
	33.	SIT ON MAT: PIVOTS 90°, WITHOUT ARMS ASSISTING	0☐	1☐	2☐	3☐	33.
*	34.	SIT ON BENCH: MAINTAINS, ARMS AND FEET FREE, 10 SECONDS	0☐	1☐	2☐	3☐	34.
*	35.	STD: ATTAINS SIT ON SMALL BENCH	0☐	1☐	2☐	3☐	35.
*	36.	ON THE FLOOR: ATTAINS SIT ON SMALL BENCH	0☐	1☐	2☐	3☐	36.
*	37.	ON THE FLOOR: ATTAINS SIT ON LARGE BENCH	0☐	1☐	2☐	3☐	37.
		TOTAL DIMENSION B	☐				

	Item	C: CRAWLING & KNEELING	SCORE				NT
	38.	PR: CREEPS FORWARD 1.8m (6')	0☐	1☐	2☐	3☐	38.
*	39.	4 POINT: MAINTAINS, WEIGHT ON HANDS AND KNEES, 10 SECONDS	0☐	1☐	2☐	3☐	39.
*	40.	4 POINT: ATTAINS SIT ARMS FREE	0☐	1☐	2☐	3☐	40.
*	41.	PR: ATTAINS 4 POINT, WEIGHT ON HANDS AND KNEES	0☐	1☐	2☐	3☐	41.
*	42.	4 POINT: REACHES FORWARD WITH R ARM, HAND ABOVE SHOULDER LEVEL	0☐	1☐	2☐	3☐	42.
*	43.	4 POINT: REACHES FORWARD WITH L ARM, HAND ABOVE SHOULDER LEVEL	0☐	1☐	2☐	3☐	43.
*	44.	4 POINT: CRAWLS OR HITCHES FORWARD 1.8m(6')	0☐	1☐	2☐	3☐	44.
*	45.	4 POINT: CRAWLS RECIPROCALLY FORWARD1.8m (6')	0☐	1☐	2☐	3☐	45.
*	46.	4 POINT: CRAWLS UP 4 STEPS ON HANDS AND KNEES/FEET	0☐	1☐	2☐	3☐	46.
	47.	4 POINT: CRAWLS BACKWARDS DOWN 4 STEPS ON HANDS AND KNEES/FEET	0☐	1☐	2☐	3☐	47.
*	48.	SIT ON MAT: ATTAINS HIGH KN USING ARMS, MAINTAINS, ARMS FREE, 10 SECONDS	0☐	1☐	2☐	3☐	48.
	49.	HIGH KN: ATTAINS HALF KN ON R KNEE USING ARMS, MAINTAINS, ARMS FREE, 10 SECONDS	0☐	1☐	2☐	3☐	49.
	50.	HIGH KN: ATTAINS HALF KN ON L KNEE USING ARMS, MAINTAINS, ARMS FREE, 10 SECONDS	0☐	1☐	2☐	3☐	50.
*	51.	HIGH KN: KN WALKS FORWARD 10 STEPS, ARMS FREE	0☐	1☐	2☐	3☐	51.

TOTAL DIMENSION C ☐

	Item	D: STANDING	SCORE				NT
*	52.	ON THE FLOOR: PULLS TO STD AT LARGE BENCH	0☐	1☐	2☐	3☐	52.
*	53.	STD: MAINTAINS, ARMS FREE, 3 SECONDS	0☐	1☐	2☐	3☐	53.
*	54.	STD: HOLDING ON TO LARGE BENCH WITH ONE HAND, LIFTS R FOOT, 3 SECONDS	0☐	1☐	2☐	3☐	54.
*	55.	STD: HOLDING ON TO LARGE BENCH WITH ONE HAND, LIFTS L FOOT, 3 SECONDS	0☐	1☐	2☐	3☐	55.
*	56.	STD: MAINTAINS, ARMS FREE, 20 SECONDS	0☐	1☐	2☐	3☐	56.
*	57.	STD: LIFTS L FOOT, ARMS FREE, 10 SECONDS	0☐	1☐	2☐	3☐	57.
*	58.	STD: LIFTS R FOOT, ARMS FREE, 10 SECONDS	0☐	1☐	2☐	3☐	58.
*	59.	SIT ON SMALL BENCH: ATTAINS STD WITHOUT USING ARMS	0☐	1☐	2☐	3☐	59.
*	60.	HIGH KN: ATTAINS STD THROUGH HALF KN ON R KNEE, WITHOUT USING ARMS	0☐	1☐	2☐	3☐	60.
*	61.	HIGH KN: ATTAINS STD THROUGH HALF KN ON L KNEE, WITHOUT USING ARMS	0☐	1☐	2☐	3☐	61.
*	62.	STD: LOWERS TO SIT ON FLOOR WITH CONTROL, ARMS FREE	0☐	1☐	2☐	3☐	62.
*	63.	STD: ATTAINS SQUAT, ARMS FREE	0☐	1☐	2☐	3☐	63.
*	64.	STD: PICKS UP OBJECT FROM FLOOR, ARMS FREE, RETURNS TO STAND	0☐	1☐	2☐	3☐	64.

TOTAL DIMENSION D ☐

Item		E: WALKING, RUNNING & JUMPING	SCORE				NT
*	65.	STD, 2 HANDS ON LARGE BENCH: CRUISES 5 STEPS TO R	0☐	1☐	2☐	3☐	65.
*	66.	STD, 2 HANDS ON LARGE BENCH: CRUISES 5 STEPS TO L	0☐	1☐	2☐	3☐	66.
*	67.	STD, 2 HANDS HELD: WALKS FORWARD 10 STEPS	0☐	1☐	2☐	3☐	67.
*	68.	STD, 1 HAND HELD: WALKS FORWARD 10 STEPS	0☐	1☐	2☐	3☐	68.
*	69.	STD: WALKS FORWARD 10 STEPS	0☐	1☐	2☐	3☐	69.
*	70.	STD: WALKS FORWARD 10 STEPS, STOPS, TURNS 180°, RETURNS	0☐	1☐	2☐	3☐	70.
*	71.	STD: WALKS BACKWARD 10 STEPS	0☐	1☐	2☐	3☐	71.
*	72.	STD: WALKS FORWARD 10 STEPS, CARRYING A LARGE OBJECT WITH 2 HANDS	0☐	1☐	2☐	3☐	72.
*	73.	STD: WALKS FORWARD 10 CONSECUTIVE STEPS BETWEEN PARALLEL LINES 20cm (8")APART	0☐	1☐	2☐	3☐	73.
*	74.	STD: WALKS FORWARD 10 CONSECUTIVE STEPS ON A STRAIGHT LINE 2cm (3/4") WIDE	0☐	1☐	2☐	3☐	74.
*	75.	STD: STEPS OVER STICK AT KNEE LEVEL, R FOOT LEADING	0☐	1☐	2☐	3☐	75.
*	76.	STD: STEPS OVER STICK AT KNEE LEVEL, L FOOT LEADING	0☐	1☐	2☐	3☐	76.
*	77.	STD: RUNS 4.5m (15'), STOPS & RETURNS	0☐	1☐	2☐	3☐	77.
*	78.	STD: KICKS BALL WITH R FOOT	0☐	1☐	2☐	3☐	78.
*	79.	STD: KICKS BALL WITH L FOOT	0☐	1☐	2☐	3☐	79.
*	80.	STD: JUMPS 30cm (12") HIGH, BOTH FEET SIMULTANEOUSLY	0☐	1☐	2☐	3☐	80.
*	81.	STD: JUMPS FORWARD 30 cm (12"), BOTH FEET SIMULTANEOUSLY	0☐	1☐	2☐	3☐	81.
*	82.	STD ON R FOOT: HOPS ON R FOOT 10 TIMES WITHIN A 60cm (24") CIRCLE	0☐	1☐	2☐	3☐	82.
*	83.	STD ON L FOOT: HOPS ON L FOOT 10 TIMES WITHIN A 60cm (24") CIRCLE	0☐	1☐	2☐	3☐	83.
*	84.	STD, HOLDING 1 RAIL: WALKS UP 4 STEPS, HOLDING 1 RAIL, ALTERNATING FEET	0☐	1☐	2☐	3☐	84.
*	85.	STD, HOLDING 1 RAIL: WALKS DOWN 4 STEPS, HOLDING 1 RAIL, ALTERNATING FEET	0☐	1☐	2☐	3☐	85.
*	86.	STD: WALKS UP 4 STEPS, ALTERNATING FEET	0☐	1☐	2☐	3☐	86.
*	87.	STD: WALKS DOWN 4 STEPS, ALTERNATING FEET	0☐	1☐	2☐	3☐	87.
*	88.	STD ON 15cm (6") STEP: JUMPS OFF, BOTH FEET SIMULTANEOUSLY	0☐	1☐	2☐	3☐	88.

TOTAL DIMENSION E ☐

Was this assessment indicative of this child's "regular" performance? YES ☐ NO ☐
COMMENTS:

GMFM-88 SUMMARY SCORE

DIMENSION	CALCULATION OF DIMENSION % SCORES	GOAL AREA (indicated with ✓ check)
A. Lying & Rolling	$\frac{\text{Total Dimension A}}{51} = \frac{\_\_\_\_\_\_}{51} \times 100 = \_\_\_\_\_\_\_\_ \%$	A. ☐
B. Sitting	$\frac{\text{Total Dimension B}}{60} = \frac{\_\_\_\_\_\_}{60} \times 100 = \_\_\_\_\_\_\_\_ \%$	B. ☐
C. Crawling & Kneeling	$\frac{\text{Total Dimension C}}{42} = \frac{\_\_\_\_\_\_}{42} \times 100 = \_\_\_\_\_\_\_\_ \%$	C. ☐
D. Standing	$\frac{\text{Total Dimension D}}{39} = \frac{\_\_\_\_\_\_}{39} \times 100 = \_\_\_\_\_\_\_\_ \%$	D. ☐
E. Walking, Running & Jumping	$\frac{\text{Total Dimension E}}{72} = \frac{\_\_\_\_\_\_}{72} \times 100 = \_\_\_\_\_\_\_\_ \%$	E. ☐

$$\textbf{TOTAL SCORE} = \frac{\%A + \%B + \%C + \%D + \%E}{\text{Total \# of Dimensions}}$$

$$= \frac{\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_}{5} = \_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_ \%$$

$$\textbf{GOAL TOTAL SCORE} = \frac{\text{Sum of \%scores for each dimension identified as a goal area}}{\text{\# of Goal areas}}$$

$$= \_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_ \%$$

GMFM-66 Gross Motor Ability Estimator Score [1]

GMFM-66 Score = ________________ __________ to __________

95% Confidence Intervals

previous GMFM-66 Score = ________________ __________ to __________

95% Confidence Intervals

change in GMFM-66 = ________________

[1] from the Gross Motor Ability Estimator (GMAE-2) Software

TESTING WITH AIDS/ORTHOSES USING THE GMFM-88

Indicate below with a check (4) which aid/orthosis was used and what dimension it was first applied. (There may be more than one).

AID		Dimension	Orthosis		Dimension
Rollator/pusher	☐	______	Hip Control	☐	______
Walker	☐	______	Knee Control	☐	______
H Frame crutches	☐	______	Ankle-foot Control	☐	______
Crutches	☐	______	Foot Control	☐	______
Quad Cane	☐	______	Shoes	☐	______
Cane	☐	______	None	☐	______
None	☐	______	Other ______ (please specify)	☐	______
Other ______ (please specify)	☐	______			

GMFM-88 SUMMARY SCORE USING AIDS/ORTHOSES

DIMENSION	CALCULATION OF DIMENSION % SCORES						GOAL AREA (indicated with ✓ check)
F. Lying & Rolling	$\frac{\text{Total Dimension A}}{51}$	=	$\frac{\_\_\_\_\_\_}{51}$	× 100 =	______	%	A. ☐
G. Sitting	$\frac{\text{Total Dimension B}}{60}$	=	$\frac{\_\_\_\_\_\_}{60}$	× 100 =	______	%	B. ☐
H. Crawling & Kneeling	$\frac{\text{Total Dimension C}}{42}$	=	$\frac{\_\_\_\_\_\_}{42}$	× 100 =	______	%	C. ☐
I. Standing	$\frac{\text{Total Dimension D}}{39}$	=	$\frac{\_\_\_\_\_\_}{39}$	× 100 =	______	%	D. ☐
J. Walking, Running & Jumping	$\frac{\text{Total Dimension E}}{72}$	=	$\frac{\_\_\_\_\_\_}{72}$	× 100 =	______	%	E. ☐

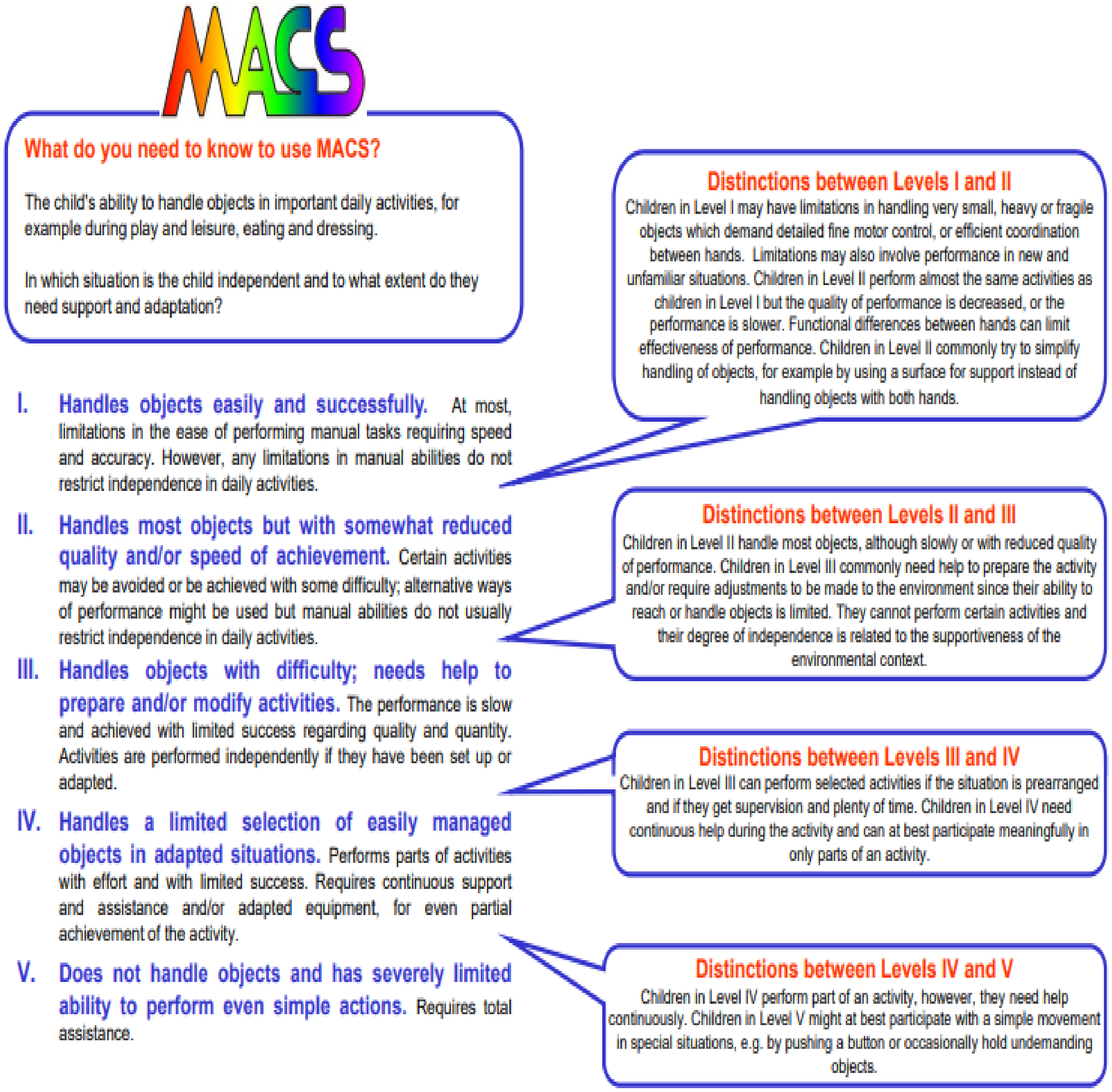
TOTAL SCORE = $\frac{\%A + \%B + \%C + \%D + \%E}{\text{Total \# of Dimensions}}$

$= \frac{\_\_\_\_\_\_\_\_\_\_\_\_}{5} = \_\_\_\_\_\_ = \_\_\_\_\_\_\ \%$

GOAL TOTAL SCORE = $\frac{\text{Sum of \%scores for each dimension identified as a goal area}}{\text{\# of Goal areas}}$

$= \_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\ \%$

APPENDIX 3: MANUAL ABILITY CLASSIFICATION SYSTEM (MACS)



MACS

What do you need to know to use MACS?

The child's ability to handle objects in important daily activities, for example during play and leisure, eating and dressing.

In which situation is the child independent and to what extent do they need support and adaptation?

I. **Handles objects easily and successfully.** At most, limitations in the ease of performing manual tasks requiring speed and accuracy. However, any limitations in manual abilities do not restrict independence in daily activities.

II. **Handles most objects but with somewhat reduced quality and/or speed of achievement.** Certain activities may be avoided or be achieved with some difficulty; alternative ways of performance might be used but manual abilities do not usually restrict independence in daily activities.

III. **Handles objects with difficulty; needs help to prepare and/or modify activities.** The performance is slow and achieved with limited success regarding quality and quantity. Activities are performed independently if they have been set up or adapted.

IV. **Handles a limited selection of easily managed objects in adapted situations.** Performs parts of activities with effort and with limited success. Requires continuous support and assistance and/or adapted equipment, for even partial achievement of the activity.

V. **Does not handle objects and has severely limited ability to perform even simple actions.** Requires total assistance.

Distinctions between Levels I and II

Children in Level I may have limitations in handling very small, heavy or fragile objects which demand detailed fine motor control, or efficient coordination between hands. Limitations may also involve performance in new and unfamiliar situations. Children in Level II perform almost the same activities as children in Level I but the quality of performance is decreased, or the performance is slower. Functional differences between hands can limit effectiveness of performance. Children in Level II commonly try to simplify handling of objects, for example by using a surface for support instead of handling objects with both hands.

Distinctions between Levels II and III

Children in Level II handle most objects, although slowly or with reduced quality of performance. Children in Level III commonly need help to prepare the activity and/or require adjustments to be made to the environment since their ability to reach or handle objects is limited. They cannot perform certain activities and their degree of independence is related to the supportiveness of the environmental context.

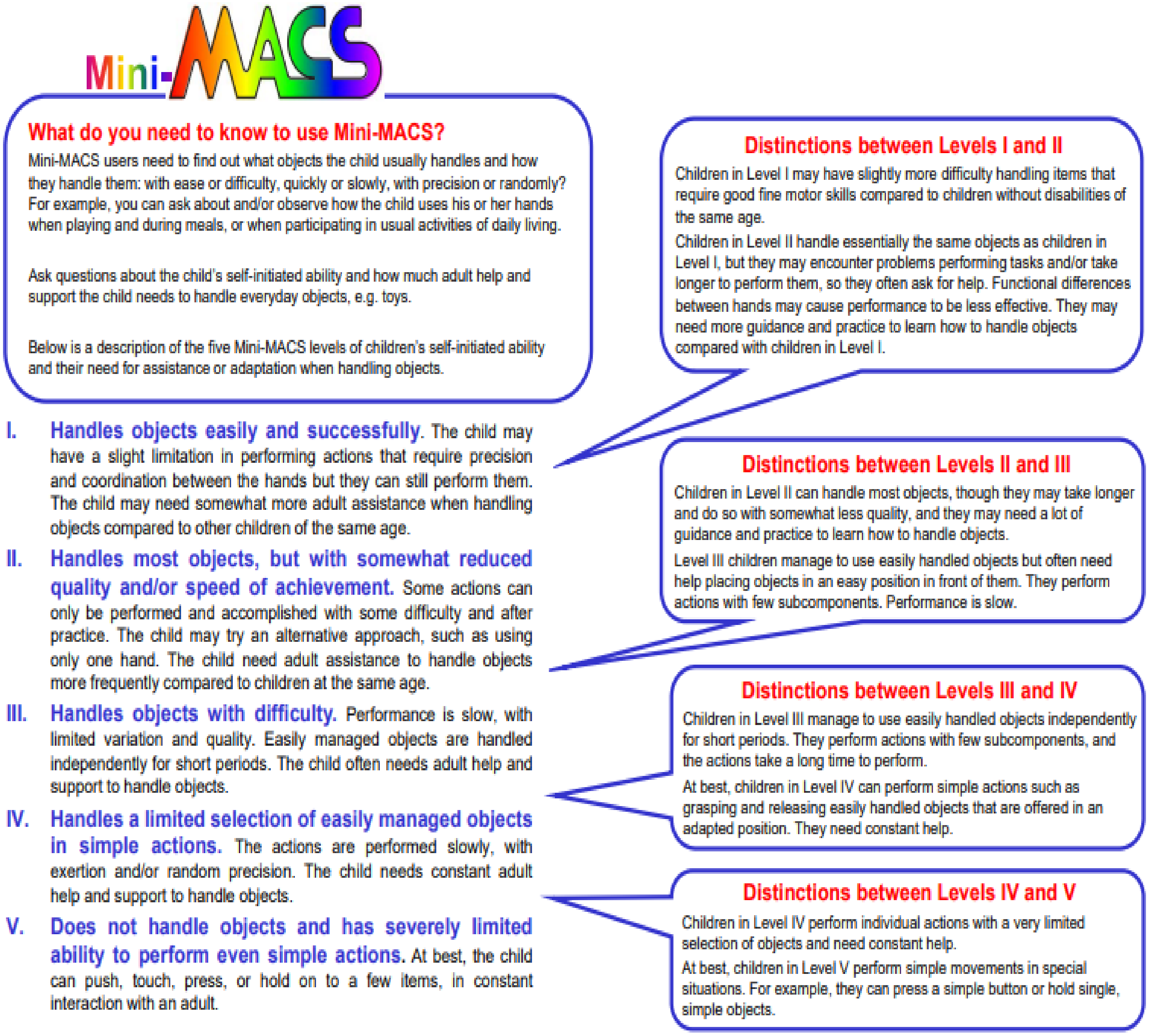
Distinctions between Levels III and IV

Children in Level III can perform selected activities if the situation is prearranged and if they get supervision and plenty of time. Children in Level IV need continuous help during the activity and can at best participate meaningfully in only parts of an activity.

Distinctions between Levels IV and V

Children in Level IV perform part of an activity, however, they need help continuously. Children in Level V might at best participate with a simple movement in special situations, e.g. by pushing a button or occasionally hold undemanding objects.

APPENDIX 4:MINI -MANUAL ABILITY CLASSIFICATION SYSTEM (MINI-MACS)



Mini-MACS

What do you need to know to use Mini-MACS?

Mini-MACS users need to find out what objects the child usually handles and how they handle them: with ease or difficulty, quickly or slowly, with precision or randomly? For example, you can ask about and/or observe how the child uses his or her hands when playing and during meals, or when participating in usual activities of daily living.

Ask questions about the child's self-initiated ability and how much adult help and support the child needs to handle everyday objects, e.g. toys.

Below is a description of the five Mini-MACS levels of children's self-initiated ability and their need for assistance or adaptation when handling objects.

I. **Handles objects easily and successfully.** The child may have a slight limitation in performing actions that require precision and coordination between the hands but they can still perform them. The child may need somewhat more adult assistance when handling objects compared to other children of the same age.

II. **Handles most objects, but with somewhat reduced quality and/or speed of achievement.** Some actions can only be performed and accomplished with some difficulty and after practice. The child may try an alternative approach, such as using only one hand. The child need adult assistance to handle objects more frequently compared to children at the same age.

III. **Handles objects with difficulty.** Performance is slow, with limited variation and quality. Easily managed objects are handled independently for short periods. The child often needs adult help and support to handle objects.

IV. **Handles a limited selection of easily managed objects in simple actions.** The actions are performed slowly, with exertion and/or random precision. The child needs constant adult help and support to handle objects.

V. **Does not handle objects and has severely limited ability to perform even simple actions.** At best, the child can push, touch, press, or hold on to a few items, in constant interaction with an adult.

Distinctions between Levels I and II

Children in Level I may have slightly more difficulty handling items that require good fine motor skills compared to children without disabilities of the same age.

Children in Level II handle essentially the same objects as children in Level I, but they may encounter problems performing tasks and/or take longer to perform them, so they often ask for help. Functional differences between hands may cause performance to be less effective. They may need more guidance and practice to learn how to handle objects compared with children in Level I.

Distinctions between Levels II and III

Children in Level II can handle most objects, though they may take longer and do so with somewhat less quality, and they may need a lot of guidance and practice to learn how to handle objects.

Level III children manage to use easily handled objects but often need help placing objects in an easy position in front of them. They perform actions with few subcomponents. Performance is slow.

Distinctions between Levels III and IV

Children in Level III manage to use easily handled objects independently for short periods. They perform actions with few subcomponents, and the actions take a long time to perform.

At best, children in Level IV can perform simple actions such as grasping and releasing easily handled objects that are offered in an adapted position. They need constant help.

Distinctions between Levels IV and V

Children in Level IV perform individual actions with a very limited selection of objects and need constant help.

At best, children in Level V perform simple movements in special situations. For example, they can press a simple button or hold single, simple objects.

APPENDIX 5: CHILD DEMOGRAPHIC TABLE

A. Demographic table for the child with CP

Initials of the name of participant	Date of recruitment	Age/ years	Sex	CP Subtype	Risk factors of CP	Comorbidities	Treatment modality used	Grouped/ individual treatment	Total no of sessions attended after the 3-month period.
Eg I.E	3/8/21	2	Male	Spastic quadriplegic	Low birth weight	none	Goal attainment therapy+ CE	individual	20 sessions

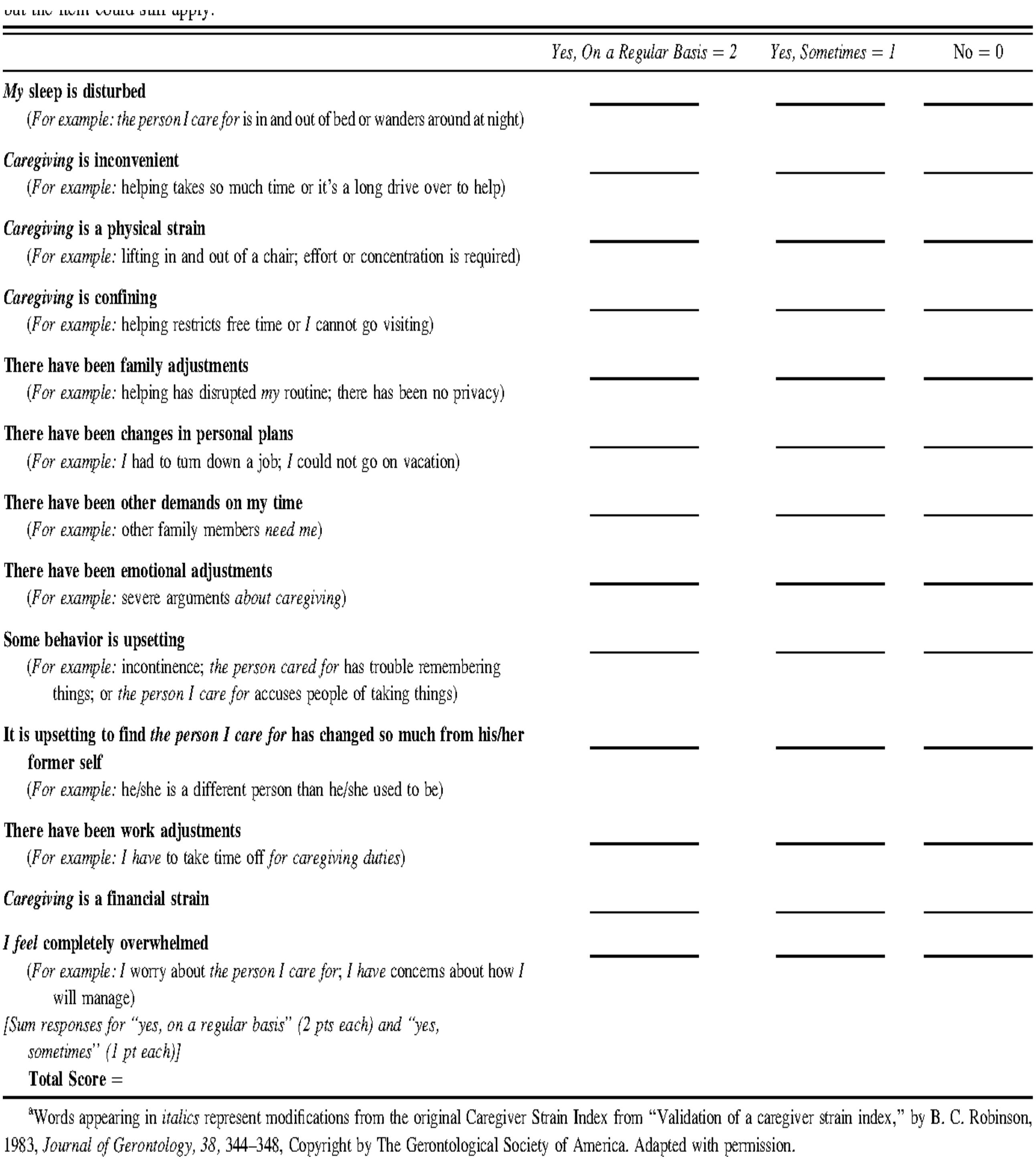
APPENDIX 6: CAREGIVER DEMOGRAPHIC TABLE

B. Demographic data of Caregiver

Initials of the name of caregiver	Tel No.	Age/ years	gender	Marital status	Educational level	Location	Distance from the Hospital	Occupation
Eg. N.O	0244301456	27	Female	Married	J.H.S level	Ahoe	50km	Trader

APPENDIX 7: MODIFIED CAREGIVER STRAIN INDEX

Modified Caregiver Strain Index (CSI). I am going to read a list of things that other people have found to be difficult. *Would you tell me whether any of these apply to you?* (GIVE EXAMPLES)



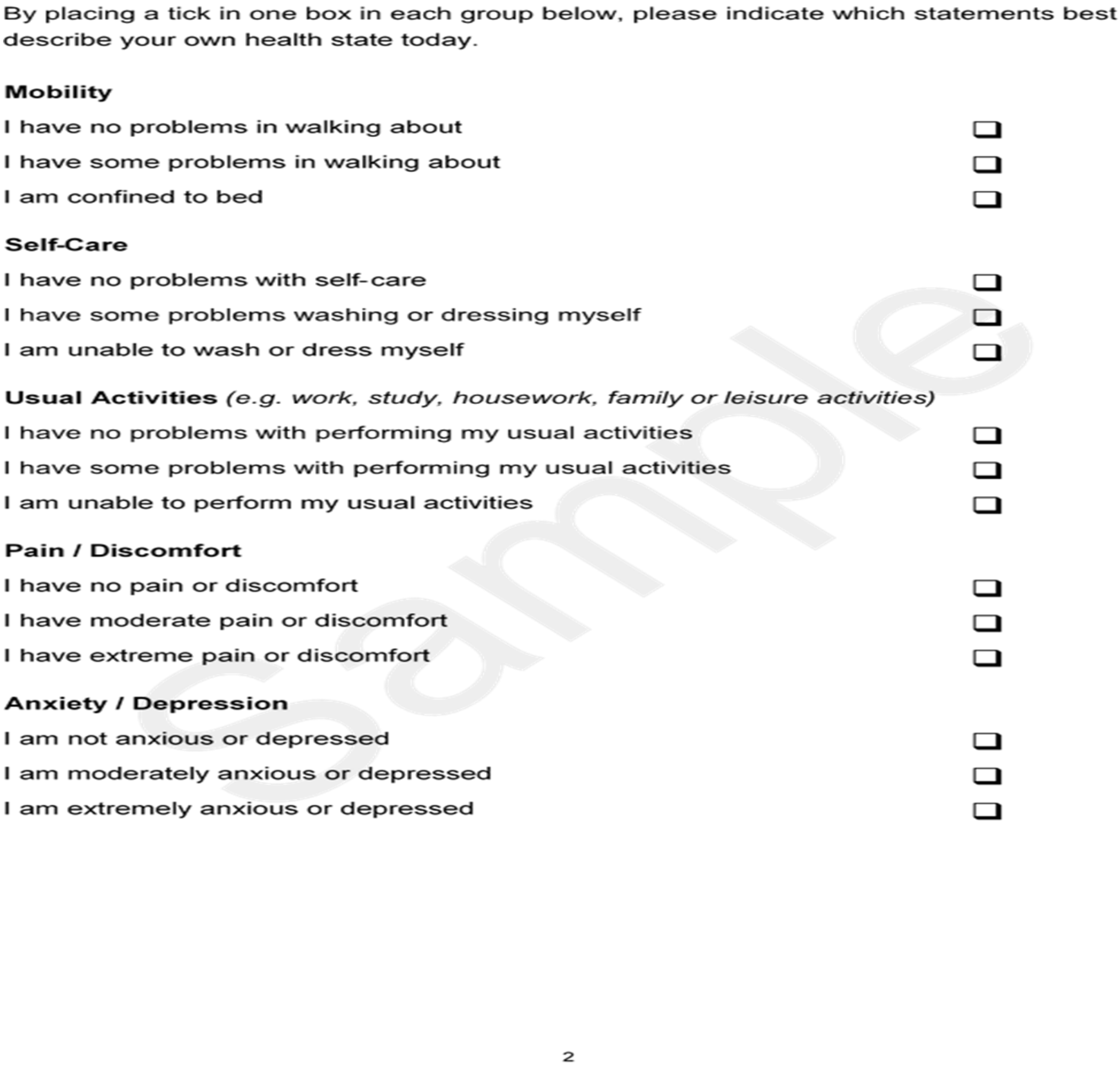
but the item could still apply.

	Yes, On a Regular Basis = 2	*Yes, Sometimes* = *1*	No = 0
My **sleep is disturbed** (*For example: the person I care for* is in and out of bed or wanders around at night)	______	______	______
Caregiving **is inconvenient** (*For example:* helping takes so much time or it's a long drive over to help)	______	______	______
Caregiving **is a physical strain** (*For example:* lifting in and out of a chair; effort or concentration is required)	______	______	______
Caregiving **is confining** (*For example:* helping restricts free time or *I* cannot go visiting)	______	______	______
There have been family adjustments (*For example:* helping has disrupted *my* routine; there has been no privacy)	______	______	______
There have been changes in personal plans (*For example: I* had to turn down a job; *I* could not go on vacation)	______	______	______
There have been other demands on my time (*For example:* other family members *need me*)	______	______	______
There have been emotional adjustments (*For example:* severe arguments *about caregiving*)	______	______	______
Some behavior is upsetting (*For example:* incontinence; *the person cared for* has trouble remembering things; or *the person I care for* accuses people of taking things)	______	______	______
It is upsetting to find *the person I care for* has changed so much from his/her former self (*For example:* he/she is a different person than he/she used to be)	______	______	______
There have been work adjustments (*For example: I have* to take time off *for caregiving duties*)	______	______	______
Caregiving **is a financial strain**	______	______	______
I feel **completely overwhelmed** (*For example: I* worry about *the person I care for*; *I have* concerns about how *I* will manage)	______	______	______
[Sum responses for "yes, on a regular basis" (2 pts each) and "yes, sometimes" (1 pt each)] **Total Score =**			

[a] Words appearing in *italics* represent modifications from the original Caregiver Strain Index from "Validation of a caregiver strain index," by B. C. Robinson, 1983, *Journal of Gerontology, 38,* 344–348, Copyright by The Gerontological Society of America. Adapted with permission.

Robinson, B. (1983). Validation of a Caregiver Strain Index. Journal of Gerontology. 38:344-348.

APPENDIX 8: HEALTH RELATED QUALITY OF LIFE (HRQoL), EQ-5D-3L VERSION



By placing a tick in one box in each group below, please indicate which statements best describe your own health state today.

Mobility

I have no problems in walking about ☐
I have some problems in walking about ☐
I am confined to bed ☐

Self-Care

I have no problems with self-care ☐
I have some problems washing or dressing myself ☐
I am unable to wash or dress myself ☐

Usual Activities *(e.g. work, study, housework, family or leisure activities)*

I have no problems with performing my usual activities ☐
I have some problems with performing my usual activities ☐
I am unable to perform my usual activities ☐

Pain / Discomfort

I have no pain or discomfort ☐
I have moderate pain or discomfort ☐
I have extreme pain or discomfort ☐

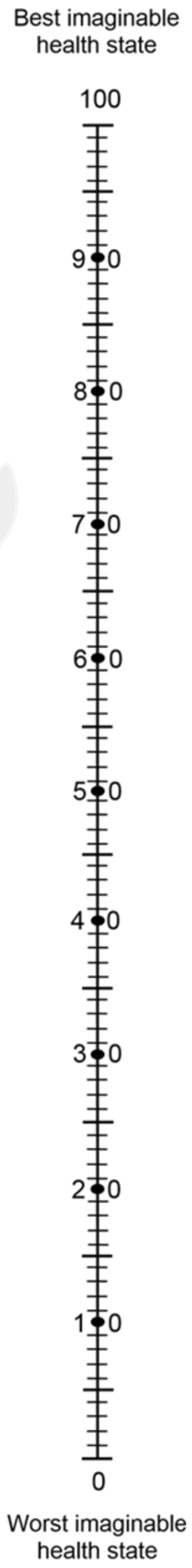
Anxiety / Depression

I am not anxious or depressed ☐
I am moderately anxious or depressed ☐
I am extremely anxious or depressed ☐

To help people say how good or bad a health state is, we have drawn a scale (rather like a thermometer) on which the best state you can imagine is marked 100 and the worst state you can imagine is marked 0.

We would like you to indicate on this scale how good or bad your own health is today, in your opinion. Please do this by drawing a line from the box below to whichever point on the scale indicates how good or bad your health state is today.

Your own health state today



APPENDIX 9: MEDRISK SATISFACTION WITH PHYSIOTHERAPY SERVICE QUESTIONNAIRE DESIGNED BY BEATTIE, 2005.

1. The receptionist is courteous
2. The registration process is appropriate
3. The process is appropriate
4. The waiting area is comfortable
5. My therapist thoroughly explains the treatments I receive
6. My therapist treats me respectfully
7. My therapist does not listen to my concerns
8. My therapist answers all my questions
9. My therapist advices me on ways to avoid future problems
10. My therapist gives me detailed instructions regarding my home program
11. Overall, I am completely satisfied with the services I receive from my therapist
12. I would return to this office for future services or care.

The items contained within the MedRisk Instrument for Measuring Patient Satisfaction with Physical Therapy Care. Items 1 to 3 represent the external factor, while items 4 to 10 represent the internal factor. Items 11 and 12 are global measures of satisfaction. Patients were instructed to complete a 1 to 5 rating scale for each item (1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree). Items 4 and 7 were recoded as positive during scoring (strongly disagree, 5; strongly agree, 1).

APPENDIX 10: ATTENDANCE TABLE.

Attendance table to measure total attendance to therapy sessions, reasons for non-attendance and the type of treatment approach used.

Patient Name Reason for attendance Treatment approach used	20/4/21	28/4/21	5/5/21	12/5/21	19/5/21	26/5/21	2/6/21	9/6/21	16/6/21
Eg. M.A Reason for attendance Treatment approach used	√ Conventional therapy	× Eg. Child was sick.	√ Conventional therapy	√ Conventional therapy	× Caregiver went to work	× Caregiver went to work	× Caregiver went to work	√ Conventional therapy	√ Conventional therapy
Eg. Q.E	√	√	√	√	√	√	√	√	√

Reason for attendance Treatment approach used									

APPENDIX 11: INFORMED CONSENT OF THE CAREGIVER AND CHILD TO PARTICIPATE IN THE STUDY.

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HEALTH SCIENCES

DHRS
Department of Health and Rehabilitation Sciences
FACULTY OF HEALTH SCIENCES

Divisions of Communication Sciences & Disorders • Disability Studies • Nursing & Midwifery • Occupational Therapy • Physiotherapy
F45 Old Main Building, Groote Schuur Hospital
Observatory, Cape Town, South Africa, 7925
Telephone: +27 (0) 21 406 6401
Website: www.dhrs.uct.ac.za

DATE:

Introduction

Dear Parent / Guardian,

My name is Sandra Banini. I am a Master's student of the University of Cape Town, Department of Health and Rehabilitation Sciences, Division of Physiotherapy. I wish to invite you and your child to participate in a study that would be comparing outcomes of grouped and individualized models of Cerebral Palsy Rehabilitation in Ghana. The reason for this research is to compare the outcomes of these models to enable us find the most effective way of meeting both the needs of your child with Cerebral Palsy, as well as your needs as a caregiver.

The title of the research study is:

Comparing outcomes of group and individualized Physiotherapy treatment models for children with cerebral palsy in Ghana; a quasi-experimental study.

I would like your permission to include you and your child in the study, as described below.

Background and Purpose of research

The aim of the study is to compare the outcomes of the Individualized Treatment Model and the Need Specific Group Treatment Model in Cerebral Palsy Rehabilitation in Ghana. The process to achieving this aim include the following:

Your involvement as the caregiver:

- During one of your child’s routine physiotherapy treatment sessions at the usual hospital, I will be assessing your child’s function using three different forms. They are:
    - The GMFCS E&R
    - The Gross Motor Function Measure (GMFM-88)
    - The MACS
- I will also be asking you to complete three forms telling me about how you as the caregiver are managing. These forms are:
    - The Modified Caregiver Strain Index
    - The Health-Related Quality of Life – EQ-5D-5L
    - The Medrisk Satisfaction Questionnaire
- The therapist who usually treats your child will ask you certain questions about your child’s age, gender and problems, to fill a table about your child’s clinical picture.

This will take about one hour to complete and will done in a quiet space away from other people.

Your child will then continue to attend his/her normal weekly treatment sessions as scheduled which is once a week. The therapist will keep a record of your attendance everyttime you come to the physiotherapy department. There will be no change to the physiotherapy management that your child usually receives.

After three months your child to be reassessed by the researcher using the same forms (GMFM-88, the GMFCS E&R and MACS). Also, the Researcher would again ask you to complete the same questionaires as before (Caregiver Strain Index, the Health-Related Quality of Life and Medrisk Satisfaction Questionnaire.

Potential Risks: There are no direct risks to yourself or your child taking part in the study. The physiotherapy treatment your child receives will not be changed in any way. Sharing some personal experiences on burden of care and quality of life may arouse some emotional discomfort. If this happens you will be able to talk this through with your usual physiotherapist, who you know well.

Benefits

The information will help therapists in Ghana to decide which model is better in addressing your needs as the caregiver and your child’s needs.

Furthermore, information from the research on the quality of life of the caregivers could offer evidence on the need for policy makers to allocate resources and form support systems for the caregivers of children with CP in Ghana.

Costs

There will be no exatra cost incurred by you for participating in this study, as everything will be done during your normal physiotherapy appointment .

COVID-19 protocols would be taken into consideration to protect both you and your child and they are:

- Wearing of face mask at all times
- Wearing of protective gown during treatment
- Washing of hands frequently and after treating every patient
- The use of hand sanitizers as often as possible
- Checking both patients and caregiver’s temperature at the reception before they are seen by the therapists.
- Social distancing from one patient to the other especially for the group therapy sessions. Also, therapy done in group forms would be done in a spacious room and caregivers would be taught how to administer the treatments to their children as directed by the therapist leading the group sessions. Every patient would be interspaced as far as possible to avoid contacts. The therapist would move round to help the caregiver during sessions from time to time.
- All bedsheets would be sent to the laundry after use by each patient.
- Equipment used for both grouped and individualized treatment would be cleaned or sprayed with alcohol before use in the next individualized or grouped sessions.

Confidentiality

All your information will be kept confidential. Your child's name will not appear on any of the assessment forms, a code will be used instead of a name, maintaining confidentiality and anonymity. The forms you sign and all the forms with information about your child will be kept in a locked cupboard at each hospital. Only the researcher and the supervisors will be able to see information, but they will not know your name or your child's name.

Voluntary participation / withdrawal

Your participation is voluntary, and you have the right not to participate in the study and can withdraw from the study at any time. This will not affect your child's treatment in any way. Treatment will continue as normal even if you do not want to be part of the study.

Permission for myself and child to be involved in the study:

CONSENT

I have read and understand the provided information	Yes	No
I have had the opportunity to ask questions	Yes	No
I understand that participation is voluntary	Yes	No
I understand that I can stop being part of the study at anytime	Yes	No
I voluntarily agree to allow my child to take part in this study	Yes	No

Signature of parent / legal guardian / thumb print:

____Date:_____________________________________

Witness:_________________________________Date:_____________________________________

Contact details:

If you have any questions, or if you would like any further information with regards to our study, please do not hesitate to contact us at the address below. If you have any ethical concerns or questions about your and/or the children's rights as they participate in the study, please contact Professor Blockman at the Human Research Ethics Committee.

Ms Sandra Banini Researcher	Ms. Nomusa Ntinga UCT Supervisor	Prof Marc Blockman Chair of Health Sciences Human Research Ethics Committee
Ho Teaching Hospital, P.O Box 374 Ho- Volta Region Ghana Phone number: 0553883361 Email:enyonamm@gmail.com	Division of Physiotherapy Department of Health and Rehabilitation Sciences University of Cape Town Groote Schuur Hospital Anzio Road Observatory, 7925 Email: nomusa.ntinga@uct.ac.za	Health Sciences Human Research Ethics Committee University of Cape Town Groote Schuur Hospital Anzio Road Observatory, 7925 Tel number: +27 21 406 6338

APPENDIX 12: CAREGIVER PHOTOGRAPH CONSENT FORM

PHOTO CONSENT FORM

I ……………………………………… (the Releasor) therefore grant ……………………………………………………(the Releasee) consent to the use of my photograph (s) or electronic media image and that of my child for academic and publishing purposes. I also have read and understood the pursposer of the research after received detailed explanations from the researcher.

……………………………………………………………………………………………….

Describe photo(s)

Revocation (check one)

☐ I understand that with my authorization below the photograph(s) may never be revoked.

☐ I understand that I may revoke this authorization at any timeby in writing. The revocation will not affect any actions taken before the receipt of this written notification. They will be kept as long as they are relevant and aftyer that time destroyed or achived.

Releasor's signature………………………………………Date………………………

Releasee's signature………………………………………Date……………………….

APPENDIX 13: ASSENT FORM

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Observatory, Cape Town, South Africa, 7925
Telephone: +27 (0) 21 406 6401
Website: www.dhrs.uct.ac.za

Dear Participant,

Date:

Dear Participant,

My name is Sandra Banini and i wish to invite you to be part of the study which is, “Comparing outcomes of group and individualized Physiotherapy treatment models for children with cerebral palsy in Ghana; a quasi-experimental study”.

VS

During one of your visits to see the Physiotherapist, we will check how you do some activities and check again after 3months. We will keep all the results private. We don’t think any big problems will happen to you as you take part of this study. The treatment you receive will not be changed in any way. The results will help us in making your treatment better and also, know how to support your parent(s)/guardian(s). All rules to prevent the spread of covid 19 will be obeyed.

You should know that:

- You do not have to be in the study if you don’t want to and won’t get into trouble if you say no.
- You may stop being in the study at any time
- Your parent(s)/guardian(s) were asked if it’s ok for you to be in this study. Even if they say its ok it’s your choice whether or not to take part.

- You can ask any questions you have, now or later. If you think of a question later, you or your parents can contact me (as given below).

You can sign this form if you have understood what you will be doing, all your questions have been answered and have talked to your parent(s)/guardian(s).

Permission to be involved in the study

CONSENT

I agree to take part in the study	Yes 	No 

Signature / thumb print: ____________________________

Date: ____

Witness: _____________________________

Date: ________________________________

Contact details:

Ms Sandra Banini Researcher	Ms. Nomusa Ntinga UCT Supervisor	Prof Marc Blockman Chair of Health Sciences Human Research Ethics Committee
Ho Teaching Hospital, P.O Box 374 Ho- Volta Region Ghana Phone number: 0553883361 Email:enyonamm@gmail.com	Division of Physiotherapy Department of Health and Rehabilitation Sciences University of Cape Town Groote Schuur Hospital Anzio Road Observatory, 7925 Email: nomusa.ntinga@uct.ac.za	Health Sciences Human Research Ethics Committee University of Cape Town Groote Schuur Hospital Anzio Road Observatory, 7925 Tel number: +27 21 406 6338

APPENDIX 14: PHOTO ASSENT FORM

PHOTO ASSENT FORM

We have asked your parents if it’s okay to talk to you, and they said yes.so want to ask if you will like to allow us to use your photo for the work we are doing.

I ………………………………..agree to allow ……………………………..to use my photograph for her project work. I know I can choose say no if no longer want my photos to be used for the study.

Permission to be involved in the study

CONSENT

 I am happy to be photographed	 Yes	 No

Signature / thumb print: ………………………Date: ………………………………

Signature of researcher: ………………………Date: ………………………………

APPENDIX 15: LETTER TO ETHICS COMMITTEE OF HO TEACHING HOSPITAL.

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Website: www.dhrs.uct.ac.za

DATE:

THE RESEARCH AND ETHICS COMMITTEE CHAIRMAN,
HO TEACHING HOSPITAL,
P.O BOX 347,
HO, V/R,
GHANA

Dear Sir/ Madam,

PERMISSION TO CONDUCT RESEARCH AT YOUR FACILITY

My name is Sandra Banini. I am a Master's student of the University of Cape Town, Department of Health and Rehabilitation Sciences, Division of Physiotherapy.

I am a Physiotherapist at the Ho Teaching Hospital. I wish to conduct academic research project in your prestigious institution that will be comparing outcomes of grouped and individualized models of Cerebral Palsy(CP) Rehabilitation in Ghana. The aim of the study is to investigate which is the most effective way of meeting both the needs of the child with Cerebral Palsy and the care givers by comparing the two Hospital-based treatment models, individual and group rehabilitation, in the Ghanaian setting.The reason for embarking on this research is that complaince to therapy appointment is a major challenge all rehabilitation of the Children with CP. In addition, this research would provide policy makers with evidence based information on the appropriate allocation of resources and provide support systems for the caregivers of children with Cerebral Palsy. The study would also add information to evidence based practice for therapists in cerebral palsy rehabilitation.

The title of the research study is:

"**Comparing outcomes of group and individualized Physiotherapy treatment models for children with cerebral palsy in Ghana; a quasi-experimental study**".

Background and Purpose of research

The aim of the study is to compare the outcomes of children with CP, receiving either the individualized treatment model or group treatment model in Cerebral Palsy Rehabilitation in Ghana. The process to achieving this aim include the following:

- The Researcher will be assessing the child on the difference in improvement in function of the children, using the (GMFM-88), GMFCS E&R and the MACS, before and after a three-month period. This will be done during one of the child's usual physiotherapy sessions and should take about 1 hour.
- The physiotherapists treating the children fill in the child's demographic information on a table. They will continue to treat the child as usual.
- Parents/guardians will be asked to complete the following questionnaires, the Modified Caregiver Strain Index (MCSI), the Health-Related Quality of Life (EQ-5D – 5L) and the Modified Medrisk Satisfaction Questionnaire (MRPS). The researcher will assist with this.

The research will be conducted at the physiotherapy departments of your hospital and nothing would be changed in the participant's treatment procedures. The ethical considerations can be viewed in the attached copy of the proposal with an attached ethical clearance from the University of Cape Town.

Confidentiality will be maintained by

Thank you for your consideration and waiting for your kind approval.

Permission for the hospital to be used as a research site:

CONSENT

I have read and understand the provided information	Yes	No
I have had the opportunity to ask questions	Yes	No
I understand that the participation of the hospital and the children/caregivers is voluntary	Yes	No
I voluntarily agree to allow this hospital to take part in this study	Yes	No

Signature of hospital Representative: ____

Date: ____

Witness: ____

Date: ____

How to contact us:

If you have any questions, or if you would like any further information with regards to our study, please do not hesitate to contact us at the address below. If you have any ethical concerns or questions about your and/or the children's rights as they participate in the study, please contact Professor Blockman at the Human Research Ethics Committee.

Ms Sandra Banini **Researcher**	**Ms. Nomusa Ntinga** **UCT Supervisor**	**Prof Marc Blockman** **Chair of Health Sciences Human Research Ethics Committee**
Ho Teaching Hospital, P.O Box 374 Ho- Volta Region Ghana Phone number: 0553883361 Email:enyonamm@gmail.com	Division of Physiotherapy Department of Health and Rehabilitation Sciences University of Cape Town Groote Schuur Hospital Anzio Road Observatory, 7925 Cell: 083 949 8333 Email: nomusa.ntinga@uct.ac.za	Health Sciences Human Research Ethics Committee University of Cape Town Groote Schuur Hospital Anzio Road Observatory, 7925 Tel number: + 27 21 406 6338

APPENDIX 16: LETTER TO ETHICS COMITTEEOF KORLE-BU TEACHING HOSPITAL

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD
HEALTH SCIENCES

DHRS
Department of Health and Rehabilitation Sciences
FACULTY OF HEALTH SCIENCES

Divisions of Communication Sciences & Disorders • Disability Studies • Nursing & Midwifery • Occupational Therapy • Physiotherapy

F45 Old Main Building, Groote Schuur Hospital
Observatory, Cape Town, South Africa, 7925
Telephone: +27 (0) 21 406 6401
Website: www.dhrs.uct.ac.za

DATE:

THE RESEARCH AND ETHICS COMMITTEE CHAIRMAN,
KORLE-BU TEACHING HOSPITAL,
P.O BOX 77,
ACCRA, GHANA

Dear Sir/ Madam,

PERMISSION TO CONDUCT RESEARCH AT YOUR FACILITY

My name is Sandra Banini. I am a Master's student of the University of Cape Town, Department of Health and Rehabilitation Sciences, Division of Physiotherapy.

I am a Physiotherapist at the Ho Teaching Hospital. I wish to conduct academic research project in your prestigious institution that will be comparing outcomes of grouped and individualized models of Cerebral Palsy(CP) Rehabilitation in Ghana. The reason for embarking on this research is due to complaince to therapy appointment being a major challenge all rehabilitation of the Children with CP. Therefore this study would reveal ways of meeting both the needs of the child with Cerebral Palsy and the care givers by trying to see which of the Hospital-based treatment models works effectively in the Ghanaian setting. In addition, this research would provide policy makers evidence based information in the appropriate allocation of resources and provide support systems for the caregivers of children with Cerebral Palsy. The study would also add information to evidence based practice for therapists in cerebral palsy rehabilitation.

The title of the research study is:

"**Comparing outcomes of group and individualized Physiotherapy treatment models for children with cerebral palsy in Ghana; a quasi-experimental study**".

Background and Purpose of research

The aim of the study is to compare the outcomes of the Individualized Treatment Model and the Need Specific Group Treatment Model in Cerebral Palsy Rehabilitation in Ghana. The process to achieving this aim include the following:

- The Researcher will be assessing the child on the Difference in improvement in function of the children, using the Gross Motor Function Measure (GMFM) and Manual ability classification system (MACS) before and after a three-month period.
- The physiotherapists taking care of your child will ask certain questions to fill a demographic table.
- Parents/guardians will be asked to complete the relative impact on the burden of care of the caregivers, by investigating whether there was a significant difference in scores reported on the Modified Caregiver Strain Index (MCSI) and the Health-Related Quality of Life (HRQoL) of the caregivers. The researcher will assist with this.
- The caregiver satisfaction with either model of rehabilitation by comparing scores on the Modified Medrisk Satisfaction Questionnaire (MRPS). The researcher will assist with this.

The research will be conducted at the physiotherapy departments of your and nothing would be changed in the participants treatment procedures. The ethical considerations can be viewed in the attached copy of the proposal with an attached ethical clearance from the University of Cape Town.

Thank you for your consideration and waiting for your kind approval.

Permission for the hospital to be used as a research site:

CONSENT

I have read and understand the provided information	Yes	No
I have had the opportunity to ask questions	Yes	No
I understand that the participation of the hospital and the children/caregivers is voluntary	Yes	No
I voluntarily agree to allow this hospital to take part in this study	Yes	No

Signature of hospital Representative: ____

Date: ____

Witness:____

Date:____

How to contact us:

If you have any questions, or if you would like any further information with regards to our study, please do not hesitate to contact us at the address below. If you have any ethical concerns or questions about your and/or the children's rights as they participate in the study, please contact Professor Blockman at the Human Research Ethics Committee.

Ms Sandra Banini Researcher	Ms. Nomusa Ntinga UCT Supervisor	Prof Marc Blockman Chair of Health Sciences Human Research Ethics Committee
Ho Teaching Hospital, P.O Box 374 Ho- Volta Region Ghana Phone number: 0553883361 Email:enyonamm@gmail.com	Division of Physiotherapy Department of Health and Rehabilitation Sciences University of Cape Town Groote Schuur Hospital Anzio Road Observatory, 7925 Cell: 083 949 8333 Email: nomusa.ntinga@uct.ac.za	Health Sciences Human Research Ethics Committee University of Cape Town Groote Schuur Hospital Anzio Road Observatory, 7925 Tel number: + 27 21 406 6338

APPENDIX 17: EWE AND TWI TRANSLATIONS FOR CONSENT FORM AND QUESTIONNAIRES

DZƆLA LA KPLEE ƉEVIA ƑE LƆLƆ̃ SI WOƉO ŊU BE WOAKPƆ ŊU LE NUSRƆ̃ƉEŊU LA ME.

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD
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Observatory, Cape Town, South Africa, 7925
Telephone: +27 (0) 21 406 6401
Website: www.dhrs.uct.ac.za

ŋkeke:

Kpɔkplɔyiɖeme

Dzila / Dzɔla Lɔlɔ̃tɔ,

Nye ŋkɔe nye Sandra Banini. Menye Master’s sukuvi le Cape Town Yunivɛsiti, Lãmesẽ Kple Gbugbɔgaɖɔɖo Dzɔdzɔmeŋutinunya Dɔwɔƒe, Lãmesẽnyawo Gbɔkpɔha ƒe Dɔwɔƒe. Medi be makpe mia kple viwòa be miakpɔ gome le numekuku aɖe si anye be woatsɔ Cerebral Palsy Rehabilitation ƒe kpɔɖeŋu siwo wowɔ le ƒuƒoƒo me kple esiwo wowɔ ɖe ame ɖekaɖekawo me ƒe emetsonuwo asɔ kple wo nɔewo le Ghana me. Nusita wowɔ numekuku sia enye be woatsɔ sɔ kple emetsonuwo asɔ kple wo nɔewo be míate ŋu akpɔ mɔ nyuitɔ kekeake si dzi míato akpɔ viwò si ŋu Cerebral Palsy le ƒe nuhiahiãwo siaa gbɔ, kpakple wò nuhiahiãwo abe dɔnɔdzikpɔla ene. Numekukua ƒe tanyae nye:

ŋusẽkpɔɖeamedzi si hiahiã tɔxɛ ƒe kpekpeɖeŋunaha ƒe atikewɔwɔ kple ame ɖekaɖekawo ƒe atikewɔwɔ ƒe kpɔɖeŋuwo le ahɔhɔ̃mekawo ƒe dɔléle gbugbɔgaɖɔɖo me le Ghana, tsɔtsɔ sɔ kple emetsonuwo.

Medi be woaɖe mɔ na wò be matsɔ wò kple viwòa ade nusɔsrɔ̃a me, abe alesi woɖe eme le ete ene.

Nusiwo dzɔ va yi kple Taɖodzinu si le numekukua ŋu:

Taɖodzinu si le numekukua ŋue nye be woatsɔ ame ɖekaɖekawo ƒe Atikewɔwɔ ƒe Kpɔɖeŋu kple Group Treatment Model ƒe emetsonuwo asɔ kple wo nɔewo le Ahɔhɔ̃mekawo ƒe Dɔlélewo Gbɔkpɔkpɔ me le Ghana. Nusiwo woawɔ atsɔ aɖo taɖodzinu sia gbɔ dometɔ aɖewoe nye nusiwo gbɔna: Wo dɔ abe vidzikpɔla ene: Le viwo ƒe "Physio" vava wo me la, mado viwo akpɔ le mɔ etɔ siawo nu:

-GMFCS E&R

- "Gross motor functional Measure" GMFM-88.

- MACS

Me dzi yi ge axɔ biabia adewo ƒe nuɖoɖo tso gbɔwo si wo le agbãle aɖewo dzi. Agbalẽa woenye si

- (The Modified Caregiver Strain Index)

- (The Health – Related Quality Of Life – EQ – 5D – 5L)

- (The Medrisk Satisfaction Questionnaire)

Ma bia wo nya aɖewo wò tso viwòa ƒe ƒexɔxɔ, ŋutsu alo nyɔnu nyenye kple kuxiwo ŋu, be nàkpe kplɔ̃ aɖe ɖo tso y mía vi ƒe dɔdaƒe ƒe nɔnɔmetata ŋu. Esia axɔ abe gaƒoƒo ɖeka ene hafi woawu enu eye woawɔe le teƒe si tomefafa le si didi tso ame bubuwo gbɔ. Emegbe viwòa ayi edzi ade eƒe kwasiɖa sia kwasiɖa ƒe atikewɔwɔ ƒe ɣeyiɣi siwo sɔ la abe alesi woɖoe ene si nye zi ɖeka le kwasiɖa me. Atikewɔla la awɔ wò vavalawo ƒe nuŋlɔɖi ɣesiaɣi si nèva lãmesẽnyawo gbɔ kpɔƒea. Tɔtrɔ aɖeke manɔ lãmesẽnyawo gbɔ kpɔkpɔ ƒe ɖoɖo si viwòa xɔna zi geɖe la ŋu o. Le ɣleti etɔ̃ megbe la, numekula la nagbugbɔ ŋku alé ɖe viwòa ŋu to agbalẽvi mawo ke zazã me (GMFM-88, GMFCS E&R kple MACS). Azɔ hã, Numekulaa agabia tso asiwò be nàkpe nyabiase gbalẽvi siwo nɔ anyi tsã la ke ɖo (Caregiver Strain Index, the Health-Related Quality of Life and Medrisk Satisfaction Questionnaire.

<u>Afɔku siwo ate ŋu ado tso eme:</u> Afɔku aɖeke meli tẽ na wò ŋutɔ alo viwòa ne èkpɔ gome le numekukua me o. Womatrɔ asi le ŋutilãmedɔdamɔnu si viwòa xɔna ŋu le mɔ aɖeke nu o. Ame ŋutɔ ƒe nuteƒekpɔkpɔ aɖewo gbɔgblɔ le belélename ƒe agba kple agbenɔnɔ ƒe nyonyome ŋu ate ŋu anyɔ seselelãme ƒe fuɖename aɖewo. Ne esia dzɔ la àte ŋu aƒo nu tso esia ŋu nyuie kple wò lãmesẽdɔwɔla si nèwɔna ɖaa, amesi nènya nyuie.

<u>Viɖe</u>: Nyatakakaawo akpe ɖe atikewɔlawo ŋu le Ghana be woatso nya me le kpɔɖeŋu si nyo wu le wò nuhiahiãwo gbɔ kpɔkpɔ me abe dɔnɔdzikpɔla ene kple viwòa ƒe nuhiahiãwo gbɔ kpɔkpɔ me. Gawu la, nyatakaka siwo tso numekuku si wowɔ tso dɔnɔdzikpɔlawo ƒe agbenɔnɔ ƒe nyonyome ŋu ate ŋu ana kpeɖodzi le alesi wòhiã be ɖoɖowɔlawo nama nunɔamesiwo eye woawɔ kpekpeɖeŋunaɖoɖowo na ɖevi siwo ŋu CP le ƒe dɔnɔdzikpɔlawo le Ghana ŋu.

<u>Gazazãwo:</u> Ga bubu aɖeke manɔ asiwò ɖe gomekpɔkpɔ le numekuku sia me ta o, elabena woawɔ nusianu le wò lãmesẽnyawo gbɔ kpɔkpɔ ƒe ɣeyiɣi si sɔ me .

Woabu COVID-19 ƒe ɖoɖowo ŋu be woakpɔ mia kple viwòa siaa ta eye woawoe nye:

- Modzakaɖenu dodo ɣesiaɣi
- Ametakpɔwu dodo le atikewɔwɔ me
- Asikɔklɔ enuenu kple le dɔnɔ ɖesiaɖe ƒe atikewɔwɔ vɔ megbe
- Asikɔklɔtikewo zazã zi geɖe alesi woate ŋui
- Dɔnɔwo kple dɔnɔdzikpɔla siaa ƒe dzoxɔxɔ me dzodzro le amedzrodzeƒea hafi atikewɔlawo nakpɔ wo.
- Hadomegbenɔnɔ ƒe didime tso dɔnɔ ɖeka gbɔ yi evelia gbɔ vevietɔ na ƒuƒoƒo ƒe atikewɔwɔ ƒe ɣeyiɣiwo. Azɔ hã, woawɔ atikewɔwɔ si woawɔ le ƒuƒoƒo me le xɔ si keke me eye woafia dɔnɔdzikpɔlawo alesi woawɔ atikeawo wo viwo abe alesi atikewɔla si le ŋgɔ na ƒuƒoƒoa ƒe kpekpeawo gblɔe ene. Woaɖe dɔnɔ ɖesiaɖe ɖe wo nɔewo dome alesi woate ŋui be woaƒo asa na kadodo. Atikewɔla la nɔa tsatsam be yeakpe ɖe dɔnɔdzikpɔla ŋu le ɣeyiɣiawo me tso ɣeyiɣi yi ɣeyiɣi.
- Woaɖo abadzivɔwo katã ɖe nudzadzraƒea ne dɔnɔ ɖesiaɖe zã wo vɔ.
- Woaklɔ dɔwɔnu siwo wozã na atikewɔwɔ le ƒuƒoƒo me kple esiwo wowɔ na ame ɖekaɖekawo siaa ŋu alo woatsɔ aha asisi wo ŋu hafi azã wo le ame ɖekaɖekawo alo ƒuƒoƒo me dɔdamɔnu siwo kplɔe ɖo me.

<u>Nya ɣaɣlawo gbɔ kpɔkpɔ:</u> Woaɣla wò nyatakakawo katã. Viwò ƒe ŋkɔ madze le dodokpɔgbalẽviawo dometɔ aɖeke dzi o, woazã kɔda aɖe ɖe ŋkɔ teƒe, alé nya ɣaɣlawo me ɖe asi eye womagaɖe ame ƒe ŋkɔ o. Woatsɔ agbalẽvi siwo te nède asi kple agbalẽvi siwo katã me nyatakaka siwo ku ɖe viwòa ŋu le la ade nudzraɖoƒe si wotu ɖe kɔdzi ɖesiaɖe me. Numekulaa kple dɔdzikpɔlawo koe ate ŋu akpɔ nyatakakawo, gake womanya wò ŋkɔ alo viwòa ƒe ŋkɔ o.

<u>Lɔlɔ̃nu faa gomekpɔkpɔ / asiɖeɖe le eŋu:</u> Wò lɔlɔ̃nu faa gomekpɔkpɔ le eme, eye gome le asiwò be màgakpɔ gome le nusɔsrɔ̃a me o eye àte ŋu aɖe asi le nusɔsrɔ̃a ŋu ɣesiaɣi. Esia makpɔ ŋusẽ ɖe viwòa ƒe atikewɔwɔ dzi le mɔ aɖeke nu o. Atikewɔwɔ ayi edzi abe alesi wòle ene ne mèdi be yeanɔ numekukua me o gɔ̃ hã.

Mɔɖeɖe na nye ŋutɔ kple ɖevi be míakpɔ gome le nusɔsrɔ̃a me: MɔĐEĐE

Mexlẽ nyatakaka siwo wona la eye mese wo gɔme	Ɛ	Awo
Mɔnukpɔkpɔ su asinye mebia nyawo .	Ɛ	Awo
Mese egɔme be gomekpɔkpɔ le eme nye lɔlɔ̃nu faa nuwɔna	Ɛ	Awo
Mese egɔme be mate ŋu adzudzɔ nusɔsrɔ̃a ƒe akpa aɖe nɔnɔ ɣesiaɣi	Ɛ	Awo
Melɔ̃ faa be maɖe mɔ na vinye be wòakpɔ gome le numekuku sia me	Ɛ	Awo

Dzila ƒe asidede agbalẽ te / edzikpɔla le se nu / asibidɛ ƒe nuŋɔŋlɔ: _________ Ŋkeke: _________

Nutefekpɔla:___________________________________Ŋkeke:___________________________

Kadodo Ŋuti Nyatakakawo:

Ne nya aɖe le asiwò, alo ne èdi nyatakaka bubu aɖewo ku ɖe míaƒe numekukua ŋu la, taflatse mègahe ɖe megbe le kadodo me kpli mí le adrɛs si le ete la dzi o. Ne agbenyuinɔnɔ ŋuti dzitsitsi alo nyabiase aɖewo le asiwò ku ɖe wò kple/alo ɖeviwo ƒe gomenɔamesiwo ŋu esi wole gome kpɔm le numekukua me la, taflatse te ɖe Nufialagã Blockman ŋu le Amegbetɔ ƒe Numekuku ƒe Agbenɔnɔ Ŋuti Kɔmiti me.

Aƒenɔ Sandra Banini. Numekula.	Ms. Nomusa Ntinga UCT ƒe Dɔdzikpɔla	Prof Marc Blockman Lãmesẽŋutinunya Amegbetɔ Ŋuti Numekuku Agbenɔnɔ Ŋuti Kɔmiti ƒe zimenɔla
Ho Nufiafia Kɔdzi, P.O Aɖaka 374, Ho-Volta Nutome, Ghana. Telefon xexlẽdzesi: 0553883361 Email: enyoonamm@gmail.com	Lãmetsiŋusẽdɔdamɔnu ƒe mama, Lãmesẽnyawo Gbɔkpɔha kple Gbugbɔgaɖɔɖo Ŋuti Dzɔdzɔmeŋutinunya. Cape Town Yunivɛsiti. Groote Schuur Kɔdzi, Anzio Mɔdodo, Dɔwɔƒe si Kpɔa Nuwo Gbɔ, 7925. Email:nomusa.ntinga@uct.ac.za	Lãmesẽŋutinunya Amegbetɔ ƒe Numekuku Agbenɔnɔ Ŋuti Kɔmiti, Cape Town Yunivɛsiti, Groote Schuur Kɔdzi, Anzio Mɔdodo, Dɔwɔƒe si Kpɔa Nuwo Gbɔ, 7925. Tel ƒe xexlẽdzesi: +27 21 406 6338

“Modified Caregiver Strain Index (CSI)” in Ewe.

Mele nu siwo ame bubuwo kpɔ be esesẽ la ŋlɔ ge. Ðe nàgblɔ nam nenye be esiawo dometɔ aɖe ku ɖe ŋuwòa? (Gblɔ kpɔɖeŋuwo).

	edziedzi =2	ɣeaɖewoɣi=1	Awo=0
Nye alɔ̃dɔdɔ le fu ɖem nam *(Le kpɔɖeŋu me: ame si dzi mekpɔna la nɔa aba dzi hedona le aba dzi alo nɔa tsaglãla tsam le zã me.*			
Belélename nye tukara *(Le kpɔɖeŋu me: kpekpeɖeŋu nana xɔa ɣeyiɣi geɖe ŋutɔ alo enye ʋukuku dzidzi aɖe be woana kpekpeɖeŋu)*			
Beléle na ame nye ŋutilã me teteɖeanyi *(Le kpɔɖeŋu me: ele be woakɔ zikpui dzi ahado le eme, agbagbadzedze alo susu tsɔtsɔ ɖo nu ŋu hiã)*			
Beléle na ame nye nusi xea mɔ na ame *(Le kpɔɖeŋu me; kpekpeɖeŋu nana xea mɔ na lime femaxee alo / mate ŋui o, yi sasrãkpɔ)*			
Tɔtrɔ aɖewo va le ƒomea me *(Le kpɔɖeŋu me: kpekpeɖeŋunana na tɔtɔ nye ɖoɖowɔɖiwo; ame ŋutɔ fe nyawo meganɔ anyi o)*			
Tɔtrɔwo va le ame ŋutɔ ƒe ɖoɖowo me *(Le kpɔɖeŋu me: Ele nam be magbe dɔ aɖe, nyemate ŋu ayi mɔkeke o)*			
Nu bubuwo hã bia tso nye ɣeyiɣia si *(Le kpɔɖeŋu me: Ƒomea me tɔ bubuwo hiãm)*			
Wotrɔ asi le seselelãme ŋu *(Le kpɔɖeŋu me: nyaʋiʋli sesẽwo le belélename ŋu)*			
Nuwɔna aɖewo doa dziku na ame *(Le kpɔɖeŋu me: ɖokuidziɖuɖu; ŋkuɖoɖonudzi sesẽna na amesi wole belém nɛnuwo, alo ame si dzi meléa be na la tsoa amewo nu be woxɔ nuwo)*.			
Etena ɖe ame dzi be makpɔe be ame si dzi meléa be na la trɔ ale gbegbe tso alesi wònɔ tsã la gbɔ *(Le kpɔɖeŋu me: enye ame si to vovo na alesi wònɔ tsã)*			
Wowɔ asitɔtrɔ le dɔ ŋu *(Le kpɔɖeŋu me: Ele nam be maxɔ mɔkeke hena belélenamedɔwo)*			
Belélename nye ganyawo ƒe kuxi			
Mesena le ɖokuinye me be nu te ɖe dzinye keŋkeŋ *(Le kpɔɖeŋu me: Metsia dzi ɖe ame si dzi meléa be na la ŋu, biabia adeo le asinye le alesi makpɔ egbɔe ŋu)*			

(Ƒo ŋuɖoɖowo nu ƒu na "ẽ, edziedzi" (2 pt ɖesiaɖe) kple "ɛ̃, ɣeaɖewoɣi" (1 pt ɖesiaɖe) awo=0 Dzesiwo Katã

Robinson, B. (fe 1983). Dɔnɔdzikpɔla fe Ƒomedodo fe Nɔnɔmetata fe Dadaɖeanyi. Amegãxiwo Ŋuti Nunya fe Agbalẽ. 38:344-348 me nyawo. Nutata fe Gomenɔamesi © Amerika fe Ame Tsitsiwo Ŋuti Nusrɔ̃ha. Wogbugbɔ tae to gbefãɖelaa fe mɔɖeɖe te. Woɖe mɔ be woagbugbɔ agbalẽ sia awɔ hena hehenana fe taɖodzinu siwo me viɖe aɖeke mele o ɖeɖeko, nenye be Woyɔ Hartford Dɔnɔdzikpɔkpɔ Ŋuti Nusrɔ̃fe, Dɔnɔdzikpɔkpɔ fe Dɔwɔfe, kple New York Yunivɛsiti be eya gbɔe wòtso. Woate ŋu akpɔe le internet dzi le www.hartfordign.org. E-mail fe nyatakaka tso eŋudɔwɔwɔ ŋu to: hartford.ign@nyu.edu.

HEALTH-RELATED QUALITY OF LIFE (HRQoL) EWE VERSION.To fli ɖe aɖaka ɖeka me le ʄuʄoʄo ɖesiaɖe si le ete me la, taflatse gblɔ nya siwo nyo wu.

Ɖe wò ŋutɔ wò lãmesẽ ʄe nɔnɔme me egbea.

Azɔlizɔzɔ

Kuxi aɖeke mele ŋunye le azɔlizɔzɔ me ŋu o.

Kuxi aɖewo le ŋunye le azɔlizɔzɔ me.

Me tsi aba me

Ɖokuidzikpɔkpɔ.

Kuxi aɖeke mele ɖokuinye dzi kpɔkpɔ ŋu o.

Me kpɔ kuxi aɖewo le nu nunyanya kple awu dodo na ɖokuinye ŋu

Nyemete ŋu klɔa ɖokuinye alo doa awu o.

Dɔ siwo wowɔna zi geɖe (e.g. dɔwɔwɔ, nusɔsrɔ̃, aʄemedɔwo, ʄome alo modzakaɖedɔwo.

Kuxi aɖeke mele ŋunye le nye dɔwɔna siwo mewɔna ɖaa la wɔwɔ me.

Kuxi aɖewo le ŋunye le nye dɔwɔwɔ siwo mewɔna ɖaa la wɔwɔ me.

Nye mate ŋu awɔ nye dɔwɔna siwo mewɔna ɖaa o.

Vevesese kple nutede ame dzi

Vevesese alo fudename aɖeke mele ŋunye o.

Vevesese alo fudename si sɔ le ŋunye.

Vevesese alo fudename sɔgbɔ eme le ŋunye.

Dzimaɖitsitsi / Blanuiléle.

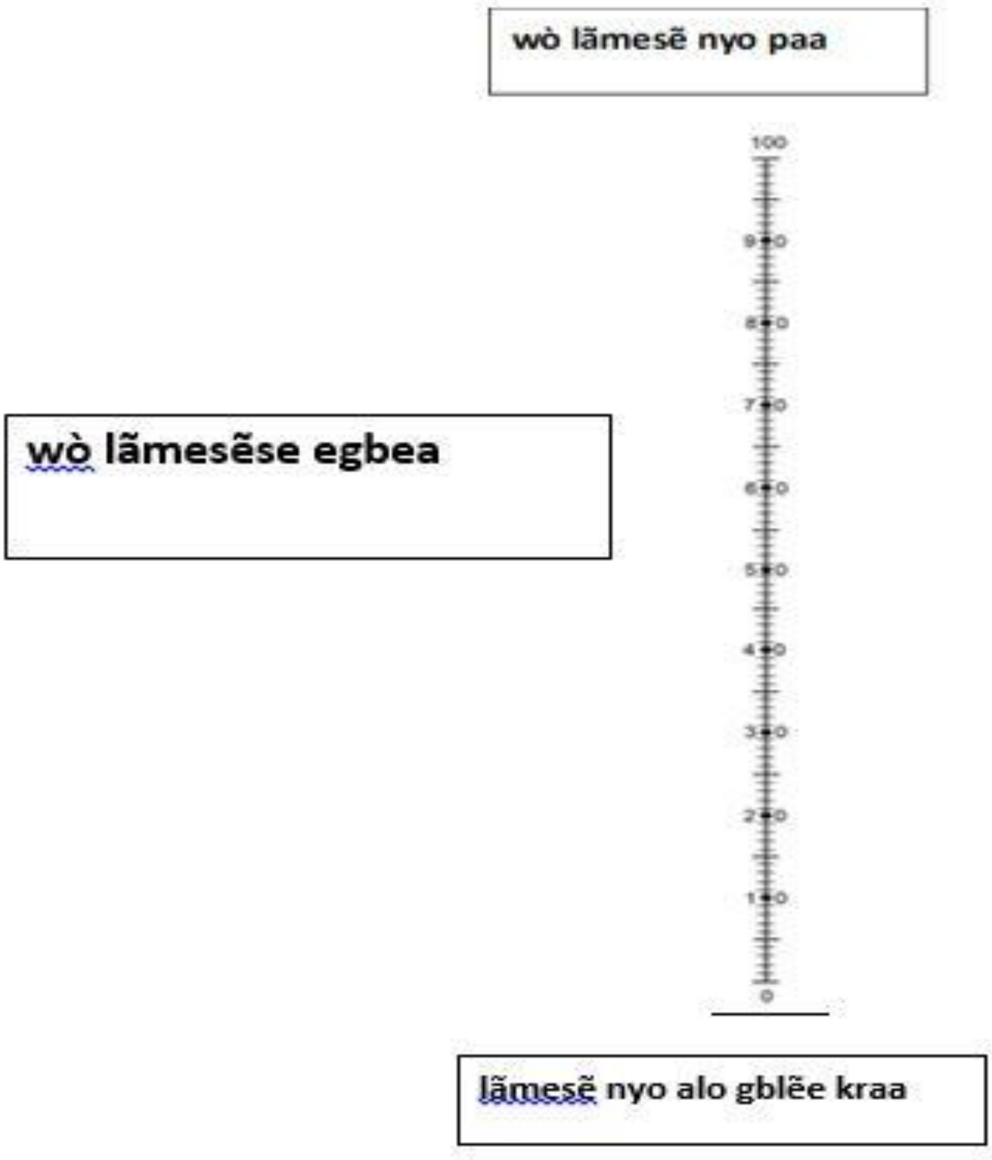
Nyemetsia dzimaɖi alo léa blanui o.

Metsia dzimaɖi le mɔ si sɔ nu alo meléa blanui.

Dzimaɖitsitsi alo blanuiléle sɔgbɔ nam.

Be woakpe ɖe amewo ŋu woagblɔ alesi gbegbe lãmesẽkuxi aɖe nyo alo gblẽe, míeta nudanu (abe dzoxɔxɔdzidzenu ene boŋ) ɖe edzi si nɔnɔme nyuitɔ kekeake si nàte ŋu asusu be enye dzesi 100 kple nɔnɔme vɔ̃ɖitɔ kekeake si nàte ŋu asusu lae nye 0.

Míedi be nàɖe alesi wònyoe afia le nudanu sia dzi alo gbegblẽ wò ŋutɔ wò lãmesẽ le egbea, le wò susu nu. Taflatse wɔe esia to fli tata tso aɖaka si le ete me yi ɖesiaɖe me teƒe si le nudanu dzi fia alesi wò lãmesẽ nyo alo gblẽe dukɔa nye egbea.



MEDRISK SATISFACTION WITH PHYSICAL THERAPY (MRSP), EWE VERSION.

Medrisk ƒe Dzidzemekpɔkpɔ le Lãmesẽfefewɔƒe ƒe Nyabiase gbalẽvi si Beattie wɔ, 2005.

1. Amedzroxɔla la wɔa nu ɖe ame ŋu nyuie
2. Alesi wowɔa ŋkɔ ŋɔŋlɔ ɖe agbalẽ me la sɔ
3. Alesi wowɔa dɔe la sɔ
4. Afisi wolalana le la me fa
5. Nye atikewɔla ɖea dɔdamɔnu siwo wowɔna nam la me tsitotsito
6. Nye atikewɔla wɔa nu ɖe ŋunye bubutɔe
7. Nye atikewɔla meɖoa to nye dzimaɖitsitsiwo o
8. Nye atikewɔla ɖoa nye biabiawo katã ŋu
9. Nye atikewɔla ɖoa aɖaŋu nam le mɔ siwo dzi mato aƒo asa na kuxi siwo ava do mo ɖa le etsɔme ŋu
10. Nye atikewɔla naa mɔfiame tsitotsitom ku ɖe nye aƒeme ɖoɖowɔɖia ŋu melɔ̃ ɖe edzi
11. Le nusianu me la, dɔ siwo mexɔna tso nye atikewɔla gbɔ la dze ŋunye bliboe
12. Matrɔ ayi ɔfis sia hena dɔwɔwɔ alo beléle le etsɔme.

Nusiwo le Medrisk Dɔwɔnu si Wotsɔ Dzidzea Dɔnɔwo ƒe Dzidzemekpɔkpɔ le Lãmesẽnyawo Gbɔkpɔkpɔ me la me, Nu 1 vaseɖe 3 tsi tre ɖi na nusi le gota, gake nu 4 vaseɖe 10 ya tsi tre ɖi na nusi le eme. Nusiwo nye 11 kple 12 nye xexeame katã ƒe dzidzemekpɔkpɔ ƒe dzidzenuwo. Wofia dɔnɔawo be woakpe dzidzenu si nye 1 va ɖo 5 ɖo ɖe nu ɖesiaɖe ŋu (1, melɔ̃ ɖe edzi kura o; 2, melɔ̃ ɖe edzi o; 3, akpaɖekedzimademade; 4, lɔ̃ ɖe edzi; S, lɔ̃ ɖe edzi vevie). Wogbugbɔ ŋlɔ nu 4 kple 7 be wonye nu nyuiwo le dzesidede ɣeyiɣi me (melɔ̃ ɖe edzi kura o, S; melɔ̃ ɖe edzi vevie, 1).

TWI TRANSLATIONS FOR CONSENT FORM AND QUESTIONNAIRES

PARTICIPANT CONSENT FORM IN TWI

Ɔhwɛfo ne abofra no pene a wɔde nimdeɛ ama sɛ wɔmfa wɔn ho nhyɛ nhwehwɛmu no mu.

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD
HEALTH SCIENCES

DHRS
Department of Health and Rehabilitation Sciences
FACULTY OF HEALTH SCIENCES

Divisions of Communication Sciences & Disorders • Disability Studies • Nursing & Midwifery • Occupational Therapy • Physiotherapy
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Website: www.dhrs.uct.ac.za

Ɛda:

<u>Nkyerɛkyerɛ mu</u>

Awofoɔ/ Ahwɛfoɔ,

Me din de Sandra Banini "masters" sukuuni ɛwɔ Cape Town suapɔn mu, ne fa a ɛhwɛ "Rehabilitation Sciences", "Division of physiotherapy". Me pɛ sɛ me fa saa akwanya yi so to nsa frɛ wo ne wo ba ɛwɔ dwumadie a ɛfa adesua ne nhwehwɛmu a ɛbɛhwɛ akuakuo ne ankorɛankorɛ wɔ "cerebral palsy rehabilitation" ayare hwɛ mu ɛwo Ghana. Adesua ne nhwehwɛmu yi botae ne sɛ wobɛdɔ sukɔ wɔ kwan papa a wobɛfa akadeɛ w'abofra a ɔwɔ "cerebral palsy" ne ahwɛfoɔ bɛ hia wɔ abofra ne hwɛ mu.

Adesua no asemti: Nsusuansoɔ a ɛwɔ nkabom/ akukuo mmoa ne ankorɛakorɛ mmoa a ɛwɔ "cerebral palsy" apomuden hwɛ mu ɛwɔ Ghana, nsusueɛ mo. Mepɛ sɛ mesrɛ kwan de wo ne woba ka saa dwumadie ne adesua yi ho sɛnea m'akyerɛkyerɛ mu nea ɛdidi soɔ yi mu no;

Nkyerɛkyerɛ Mu Ne Botae

Adesua yi botae nɛ sɛ yɛbɛsusu mmuaɛ a ɛfiri ankorɛankorɛ apomuden hwɛ mu ne hia a ɛhia wɔ akuoakuo mmoa wɔ "cerebral palsy rehabilitation" wɔ Ghana. Kwan a yɛbɛfa so aduru saa botae no na ɛdidi so yi;

Wɛ dwumadie sɛ Ahwɛfoɔ

Ɛwɔ wɔ daadaa apomuden hwɛ mu ɛwɔ "physiotherapy" no, mɛsusu w'abofra no dwumadie. Mɛgyina nneɛma mmiensa yi so;

- "GMFCS E & R"

- “Gross motor function measure (GMFM-88)”
- “MACS”

Mɛtoa so abisa wo nsɛmmisa mmiensa a ɛfa kwan a wo fa so toto wo nneama wo w’abofra no apomuden hwɛ mu;

- “Care giver strain index”
- “The Health-Related Quality of life (EQ-5D-5L)”
- “Medrisk satisfactory questionnaire”

Mɛ bisa wo nsɛm fua bi fa abofra no ho; sɛ ne mfeɛ, sɛ ɔyɛ ɔbarima anaa ɔbaa, ne haw, wobɛ hia mfoni nsɛmfua bi a ɛfa abofra no apomuden ho.

Saa dwumadie yi bɛtumi afa dɔnhwere baako ɛwɔ biaɛ bi a ɛyɛ komm a nnipa nni hɔ. W’abofra no bɛkɔ so agye ayarehwɛ naawɔtwe biara sɛ deɛ w’ahyehyɛ no ara. Na apomuden dwumayɛnii no de deɛ ɛbɛn nnawɔtwe biara no bɛba hɔ no bɛsie. Nsesae biara remma wɔ w’abofra no hwɛ hyehyɛɛ mu. Bosome mmiensa akyi no, adesua ne nhwehwɛmuyɛfoɔ bɛsusu w’abofra no dwumadie bio (“GMFM-88, GMFCS E & R, ne MACS”). Afei, yɛbɛkɔso abisa ama w’ayi nsɛmmisa bi ano sɛ deɛ woyɛɛ no mfetiaseɛ no (“Care giver strain index”, “The Health-Related Quality of life (EQ-5D-5L)” ɛne “Medrisk satisfactory questionnaire”)

Haw a ɛbɛtumi aba

Haw biara nni ho mma wo ne w’abofra no ɛwɔ saa adesua yi mu efiri sɛ nsesaɛ biara remma wɔ w’abofra no apomuden hwɛ mu. Na ɛmom, sɛ yɛrekyɛ yɛn adesua wɔ asetena, abrabɔ ne haw ɛyɛ nkwa a ɛbetumi ate yɛn yaw die bi so. Sɛ ɛkɔ ba no saa wobɛtumi ne daadaa “physiotherapist’ a wonnim no yie no adi ho nkɔmmɔ.

Mfasoɔ

Adesua yi bɛ boa ama ‘Physiotherapist’ a ɔwɔ Ghana ahunu dwumadie a ɛyɛ na ɛbɛboa w’apomuden ne ahiadeɛ wo w’abofra ne hwɛ mu. Afei nso, adesuadeɛ a ɛbɛfiri nhwehwɛmu yi mu aba no bɛtumi ayɛ adansedie ama wɔn a wɔyɛ nhyehyɛ ahodoɔ na wa tumi akyɛ nneɛma, hyehyɛ moa nhyehyɛe ahodoɔ ama cerebral palsy mmofra apɔmuden ayarehwe foɔ wɔ Ghana.

Ɛka: Woremmɔ ka foforɔ biara sɛ w'ode woho hyɛ dwuma die yi mu, ɛfiri sɛ apɔmuden nhyiamu ne nhyehyeɛ dadaa no ara mu na ɛbɛ kɔso.

COVID -19 nhyehyeɛ nso bɛkɔ so abɔ wo ne w'abofora no ho ban. ɛbi ne sɛ;

- Yɛbɛhyehyɛ "face mask" abere biara
- Yɛɛhyɛ yɛn akadeɛ berɛ yɛrehwɛ amanfoɔ
- Yɛrehohoro yɛnsa berɛ ne berɛ ano
- Yɛde nsa den ɛbe pepa yɛnsa ho bere ne bere ano
- Sɛ yɛyɛ nhwehwɛmu wɔ adwumayɛfoɔ ne wɔn a wɔbɛgye ayarehwɛ "temperature"
- Na afei nso yɛbɛma kwan ada yɛn ntam ne titiriw ne akukuo apomuden nhyehyeɛ mu
- Yɛ de mpa akatasoɔ nyinaa be kɔ biaɛ a yɛsi nnoɔma ntɛm so bera a yɛde ahwɛ obi
- Nnoɔma a yɛde di dwuma no nyinaa yɛ bɛde no ni na afei nso ana yɛde nsa den bɛpepa so berɛ biara yɛde bɛhwɛ obi.

Wo Nsɛm Ho Banbɔ

Asɛm biara ɛfa wo ne w'abofra no ho bɛkoso ayɛ me ne wo ahintasɛm. W'abofra no din remma ntwerɛ biara so, me de ahyɛnsodeɛ a ɛbɛboa ama m'abɔ w'abofra no din ho ban a obi nhunu no akyi kwan. Afei nso, mede adesua yi krataa biara bɛhyɛ baabi a agye me, nhwehwemufoɔ ne ma hwɛfoɔ wo adesua yi mu pɛ na ɛbɛtumi anya nkrataa no nanso wɔn koraa renhunu wo ne w'abofra no din.

Nyinasoɔ a ɛkyerɛ sɛ me ne m'abɔfra de yɛn ho ama wɔ saa adesua yi mu

M'akenkan nsɛmfua yi nyinaa na m'ate aseɛ	Aane	Daabi
M'anya akwanya abisa deɛ ɛkyere m'adwene nyinaa.	Aane	Daabi
M'ate aseɛ sɛ ɛnyɛ ɔhyɛ	Aane	Daabi
Mete aseɛ sɛ mɛtumi agyae berɛ biara a mepɛ	Aane	Daabi
Mete aseɛ a, ɛnyɛ ɔhyɛ so na ma ama m'abofra de ne ho ahyɛ adesua mu	Aane	Daabi

Awufuɔ ahyɛnso……………………. Eda……………………

Adansini ahyɛnso…………………… Eda………………………

Wob3tumi afrɛ nhwehwɛmufuɔ:

Sɛ wowɔ asɛm bisa bi a, anaa sɛ wopɛ nketahodie bi a, wob3tumi anya anaa wobɛhunu m'akyi kwan wo; na sɛ wopɛ nsɛmisa bi a ɛfa wo ne w'abofra fahodie ne kwan pa ho mmra ɛfa m'adesua yi ho a, wobɛtumi ne Professor Blockman ewɔ "Human Research Ethics Committee", Cape Town suapɔn mu.

Ms Sandra Banini Researcher	Ms. Nomusa Ntinga UCT Supervisor	Prof Marc Blockman, Chair of Health Sciences Human Research Ethics Committee
Ho Teaching Hospital, P.O Box 374, Ho- Volta Region, Ghana. Phone number: 0553883361 Email:enyonamm@gmail.com	Division of Physiotherapy, Department of Health and Rehabilitation Sciences, University of Cape Town, Groote Schuur Hospital, Anzio Road, Observatory, 7925. Email: nomusa.ntinga@uct.ac.za	Health Sciences Human Research Ethics Committee, University of Cape Town, Groote Schuur Hospital, Anzio Road, Observatory, 7925. Tel number: +27 21 406 6338

MODIFIED CARE GIVER STRAIN INDEX IN TWI.

Merebɛkenkan nneɛma a nnipa afoforo ahu sɛ ɛyɛ den no din. Wobɛka akyerɛ me sɛ ebia eyinom mu bi fa wo ho anaa? (Fa nhwɛso ahorow ma)

	Aane/ daa =2	Aane/ɛtɔ mmere bia =1	Dabi=0
Me nda yɛ basaa *(Sɛ nhwɛso no: onipa a mehwɛ no no da mpa so na ofi mpa so anaasɛ ɔyɛ nwonwa anadwo).*			
Ɔhwɛ a wɔde ma no gyɛ mmerɛ *(Sɛ nhwɛso no: mmoa a wɔde ma no gye bere pii anaasɛ ɛyɛ ɔkwan tenten a wobɛfa so de kar akɔboa)*			
Ɔhwɛ yɛ human mmerɛ yɛ *(Sɛ nhwɛso no: wode nipa si akongua mu anase wɔma niso; mmɔdenbɔ anaa adwene a wɔde si biribi so ho hia)*			
Ɔhwɛ gye wa daagyeɛ nyinaa *(Sɛ nhwɛso no: mmoa a wɔde ma no siw ahomegye bere ano anaasɛ mintumi nkɔ nsrahwɛ)*			
Ɔhwɛ ama nsakrae aba Abusua mu *(Sɛ nhwɛso no: mmoa a meboa no asɛe me daa dwumadi, kokoamsɛm biara mmae)*			
Nsakrae aba m'ankasa nhyehyɛe ahorow mu *(Sɛ nhwɛso no: na ɛsɛ sɛ mepo adwuma bi, na mintumi nkɔ akwamma)*			
Nneɛma foforɔ wɔ hɔa ehia wo merɛ *(Sɛ nhwɛso no: abusua no mufo afoforo hia me)*			
Ɔhwɛ ama ama woanya atenka mu nsakraɛ *(Sɛ nhwɛso no: akyinnyegye a emu yɛ den a ɛfa ɔhwɛ ho)*			
Suban bi hyɛ abufu *(Sɛ nhwɛso no: obi a ontumi nhyɛ ne ho so; onipa a na mehwɛ no no wɔ ɔhaw wɔ nneɛma a ɔkae ho, anaasɛ onipa a mehwɛ no no bɔ nkurɔfo sobo sɛ wɔfa nneɛma)*			
Ɛyɛ awerɛhow sɛ wubehu sɛ onipa a mehwɛ no no asesa kɛse afi ne kan nipasu ho. *(Sɛ nhwɛso no: ɔyɛ onipa soronko sen sɛnea na ɔte kan no)*			
Ɔhwɛ ama wɔayɛ nsakrae wɔ adwuma mu *(Sɛ nhwɛso no: Ɛsɛ sɛ migye m'ahome de yɛ ɔhwɛ adwuma)*			
Ɔhwɛ yɛ sikasɛm mu ahokyere			
Mete nka sɛ ɔhwɛ nu ahyɛ meso *(Sɛ nhwɛso no: Mehaw me ho wɔ onipa a mehwɛ no no ho, mewɔ dadwen wɔ sɛnea mɛhwɛ so no ho)*			

Mmuae a wɔde ma "aane/daa" bɛyɛ 2, "aane/ɛtɔ mmere bia" bɛyɛ 1 ɛne "Dabi" bɛyɛ 0.

Robinson, B. (1983) na ɔkyerɛwee. Ɔhwɛfo Strain Index a Wɔde Di Dwuma. Nsɛmma nhoma a ɛfa Nkwakoraa ne mmerewa ho. 38:344-348 na ɛwɔ hɔ. Copyright © Amerika Nkwakoraa ne mmerewa Fekuw no. Wɔsan yɛɛ no bio.Wɔde nhoma tintimfo no kwan na wɔasan ayɛ. Wɔama kwan sɛ wɔmfa saa nsɛm yi nyɛ nhomasua a ɛnyɛ nea wɔde hwehwɛ mfaso nkutoo, sɛ wɔka The Hartford Institute for Geriatric Nursing, Division of Nursing, and New York University ho asɛm sɛ nea efi mu ba a. Wobetumi anya wɔ intanɛt so wɔ www.hartfordign.org. Fa e-mail bɔ amanneɛ sɛ wode redi dwuma wɔ: hartford.ign@nyu.edu.

HEALTH-RELATED QUALITY OF LIFE (HRQoL) IN TWI

Meserɛ wo twerɛ nnaka yi baako mu, nea ɛkyerɛkyerɛ wo mprɛnprɛn apomuden mu yie

(Nkekaho)

Menni anante anante ho haw

Mewɔ anante anante ho haw kakra

Maka mpa mu

(Ahosohwɛ)

Menni haw wɔ m'ahoso hwɛ mu

Mewɔ haw kakra wɔ m'daereɛ ne m'aho siesie mu

Mentumi ndware na mpo m'asiesie me ho

(Dabiara dwumadi) [eg. adwuma, adesua, afie adeyɔ, abusua, ahodwodwow]

Menni haw wɔ me daadaa adwumayɛ ho

Mew) haw kakra wɔ me daadaa adwumay3 ho

Menntummi nny3 me daadaa adwuma biara

(Yaw /Ahohiahia)

Menni yaw anaa ahohiahia mu

Mefa yaw ne ahohiahia kekra mu

Mete yaw paa ne ahohiahia paa

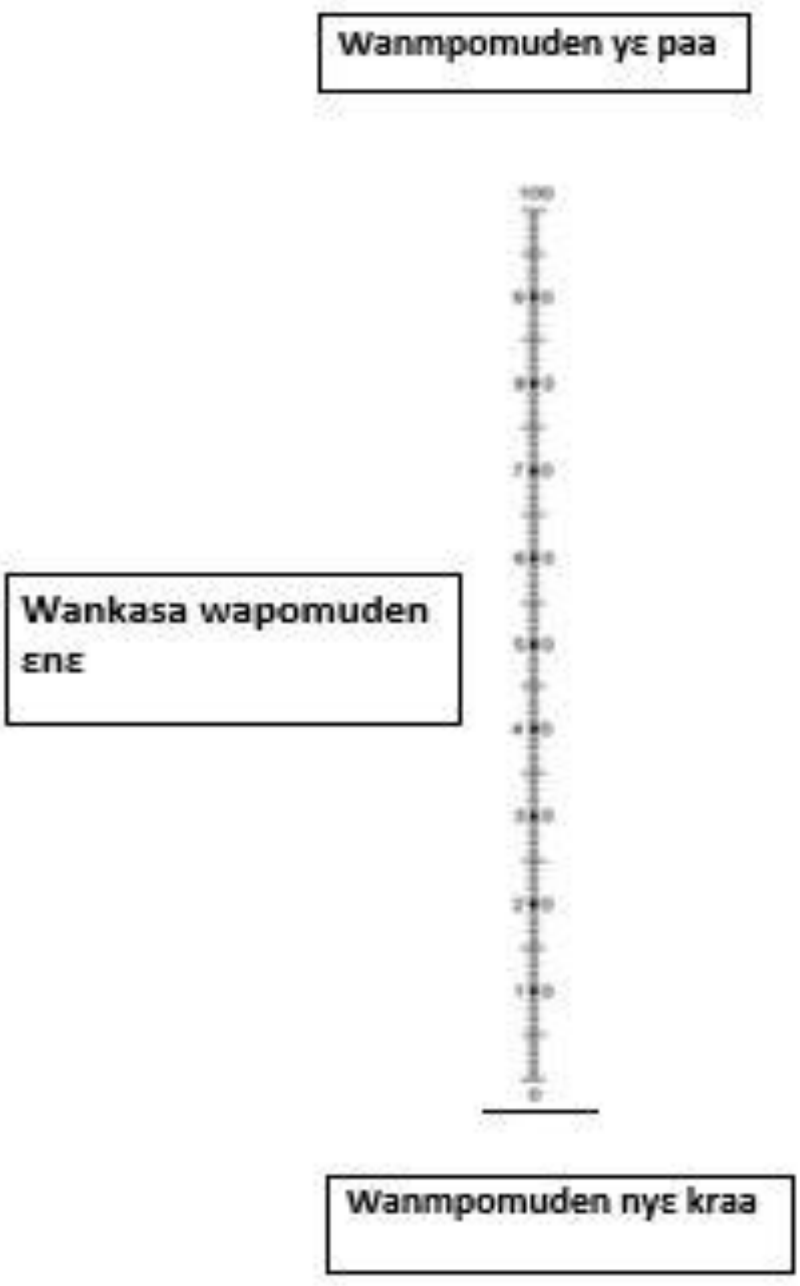
(Akomatuo) haw (adwenemuhaw – "where applicable")

Menni ɔhaw anaa akomatuo biara

Mewɔ haw ne akumatuo kakra

Mefa ɔhaw ne akomatuo mu daa

Sɛyɛ bɛboa amaa nnipa akyerɛ sɛ wanmpomuden mu yɛ anaa ɛnnyɛ nti, y’ay3 ‘scale’ aa sɛ w’pomuden mu nsɛm yɛ paa a na wafa ɔha (100) anaa sɛ w’pomuden mu nnyɛ aa na wafa hwee (0). Yɛbɛpɛ sɛ wobɛ kyerɛ yɛn sɛnea wompow mu teɛ ɛnnɛ (w) wo ankasa wonteaseɛ mu). San nnaka yi aɛwɔ ‘scale’ no so fa kyerɛ sɛ wompow mu yɛ anaa ɛnnyɛ.



MEDRISK INSTRUMENT FOR MEASURING PATIENT SATISFACTION WITH HEALTH CARE IN TWI

1. ‘Receptionist’ no bu nnipa

2. Dinkyerɛw no da ne kwanmu

3. Saa kwan no nso yɛ waano waano

4. Beayɛ aa yɛ twɛn no yɛ ahomeka (ahodwow)

5. Me ‘therapist’ no kyerɛkyerɛ m’ayaresa no mu yie

6. Me ‘therapist’ no hwɛ me obuo kwan so

7. Me ‘therapist’ no ntie m’ahiasɛm

8. Me ‘therapist’ no bua me nsɛm bisa nyinaa ano

9. Me ‘therapist’ no tu me fo fa akwan a mɛfa so akwati daakye haw (or haw a ɛbɛba daakye)

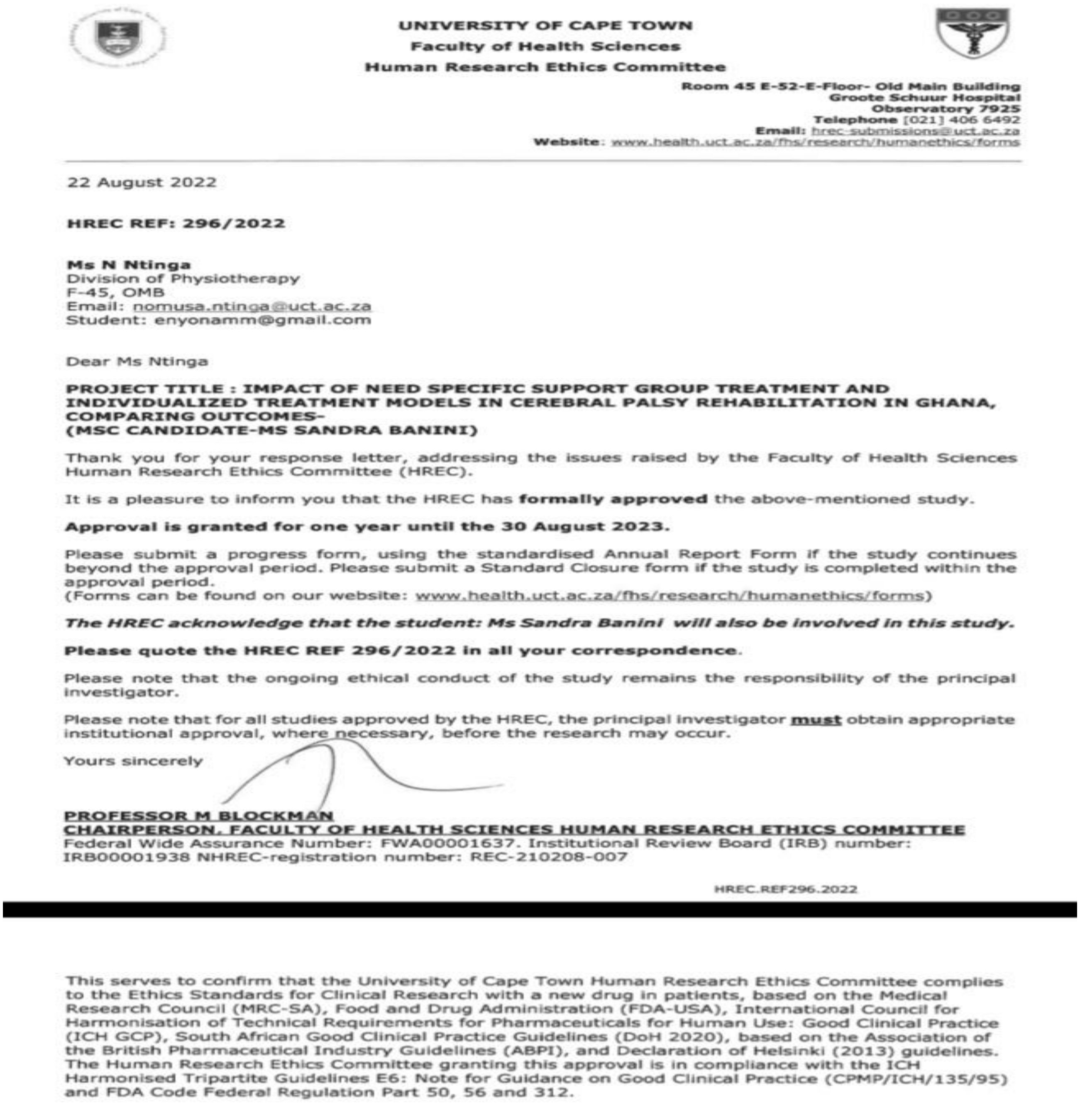
10. Me ‘therapist’ no kyerɛ me fie akwanhwɛ mu yie

11. Eyi nyinaa mu no, manisɔ sɛnea me ‘therapist’ no tenee ne ho hwɛɛ me no

12. Mɛsan aba ha bio daakye bi abɛgye ayarehwɛ

Nneɛma a ɛwɔ “Medrisk Instrument for Measuring Patient Satisfaction with Health Care” Ho no mu. Nneɛma 1 kosi 3 gyina hɔ ma akyi ade no, bere a nneɛma 4 kosi 10 gyina hɔ ma ade a ɛwɔ mu no. Nneɛma 11 ne 12 yɛ wiase nyinaa nneɛma a wɔde kyerɛ abotɔyam. Wɔhyɛɛ ayarefo no sɛ wonwie 1 kosi 5 a wɔde kyerɛ ade biara (1, mempene so koraa; 2, mempene so; 3, ɛnyɛ afã biara; 4, mepene so; 5, mepene so koraa). Wɔkyerɛw nneɛma 4 ne 7 no sɛ ɛyɛ papa bere a wɔde nkyerɛwde rema no (mempene so koraa, 5; mepene so koraa, 1).

APPENDIX 18: ETHICAL APPROVAL LETTER FROM HREC, UNIVERSITY OF CAPE TOWN, SOUTH AFRICA



UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee
Room 45 E-52-E-Floor- Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: hrec-submissions@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

22 August 2022

HREC REF: 296/2022

Ms N Ntinga
Division of Physiotherapy
F-45, OMB
Email: nomusa.ntinga@uct.ac.za
Student: enyonamm@gmail.com

Dear Ms Ntinga

PROJECT TITLE : IMPACT OF NEED SPECIFIC SUPPORT GROUP TREATMENT AND INDIVIDUALIZED TREATMENT MODELS IN CEREBRAL PALSY REHABILITATION IN GHANA, COMPARING OUTCOMES-
(MSC CANDIDATE-MS SANDRA BANINI)

Thank you for your response letter, addressing the issues raised by the Faculty of Health Sciences Human Research Ethics Committee (HREC).

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year until the 30 August 2023.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

The HREC acknowledge that the student: Ms Sandra Banini will also be involved in this study.

Please quote the HREC REF 296/2022 in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

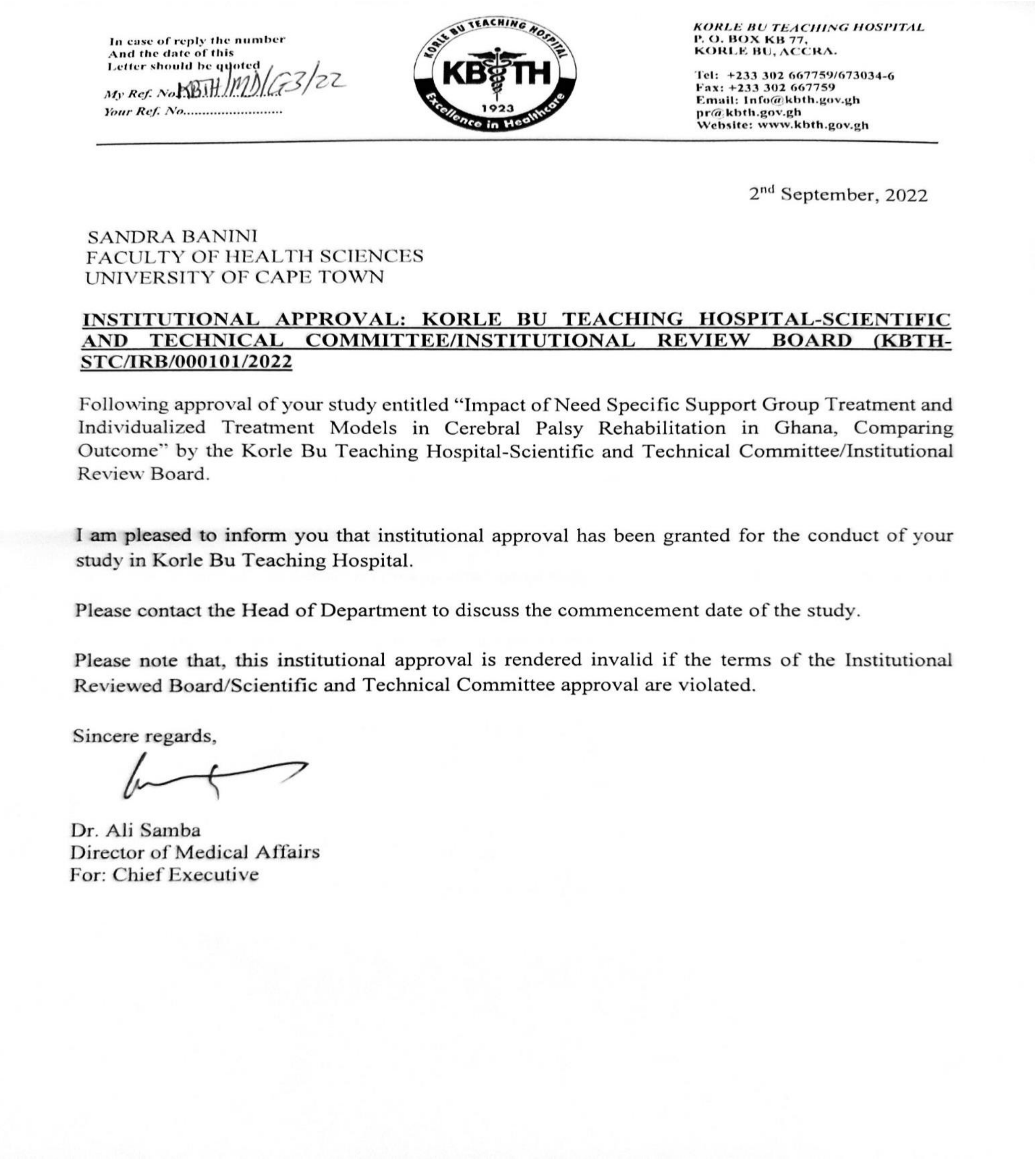
Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FACULTY OF HEALTH SCIENCES HUMAN RESEARCH ETHICS COMMITTEE
Federal Wide Assurance Number: FWA00001637. Institutional Review Board (IRB) number: IRB00001938 NHREC-registration number: REC-210208-007

HREC.REF296.2022

This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use: Good Clinical Practice (ICH GCP), South African Good Clinical Practice Guidelines (DoH 2020), based on the Association of the British Pharmaceutical Industry Guidelines (ABPI), and Declaration of Helsinki (2013) guidelines. The Human Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

APPENDIX 19: ETHICAL APPROVAL LETTER (1) FROM KORLE-BU TEACHING TEACHING HOSPITAL, GHANA



In case of reply the number
And the date of this
Letter should be quoted
My Ref. No. KBTH/MD/G3/22
Your Ref. No..........................

KORLE BU TEACHING HOSPITAL
EXCELLENCE IN HEALTHCARE
1923

KORLE BU TEACHING HOSPITAL
P. O. BOX KB 77,
KORLE BU, ACCRA.

Tel: +233 302 667759/673034-6
Fax: +233 302 667759
Email: Info@kbth.gov.gh
pr@kbth.gov.gh
Website: www.kbth.gov.gh

2nd September, 2022

SANDRA BANINI
FACULTY OF HEALTH SCIENCES
UNIVERSITY OF CAPE TOWN

INSTITUTIONAL APPROVAL: KORLE BU TEACHING HOSPITAL-SCIENTIFIC AND TECHNICAL COMMITTEE/INSTITUTIONAL REVIEW BOARD (KBTH-STC/IRB/000101/2022

Following approval of your study entitled "Impact of Need Specific Support Group Treatment and Individualized Treatment Models in Cerebral Palsy Rehabilitation in Ghana, Comparing Outcome" by the Korle Bu Teaching Hospital-Scientific and Technical Committee/Institutional Review Board.

I am pleased to inform you that institutional approval has been granted for the conduct of your study in Korle Bu Teaching Hospital.

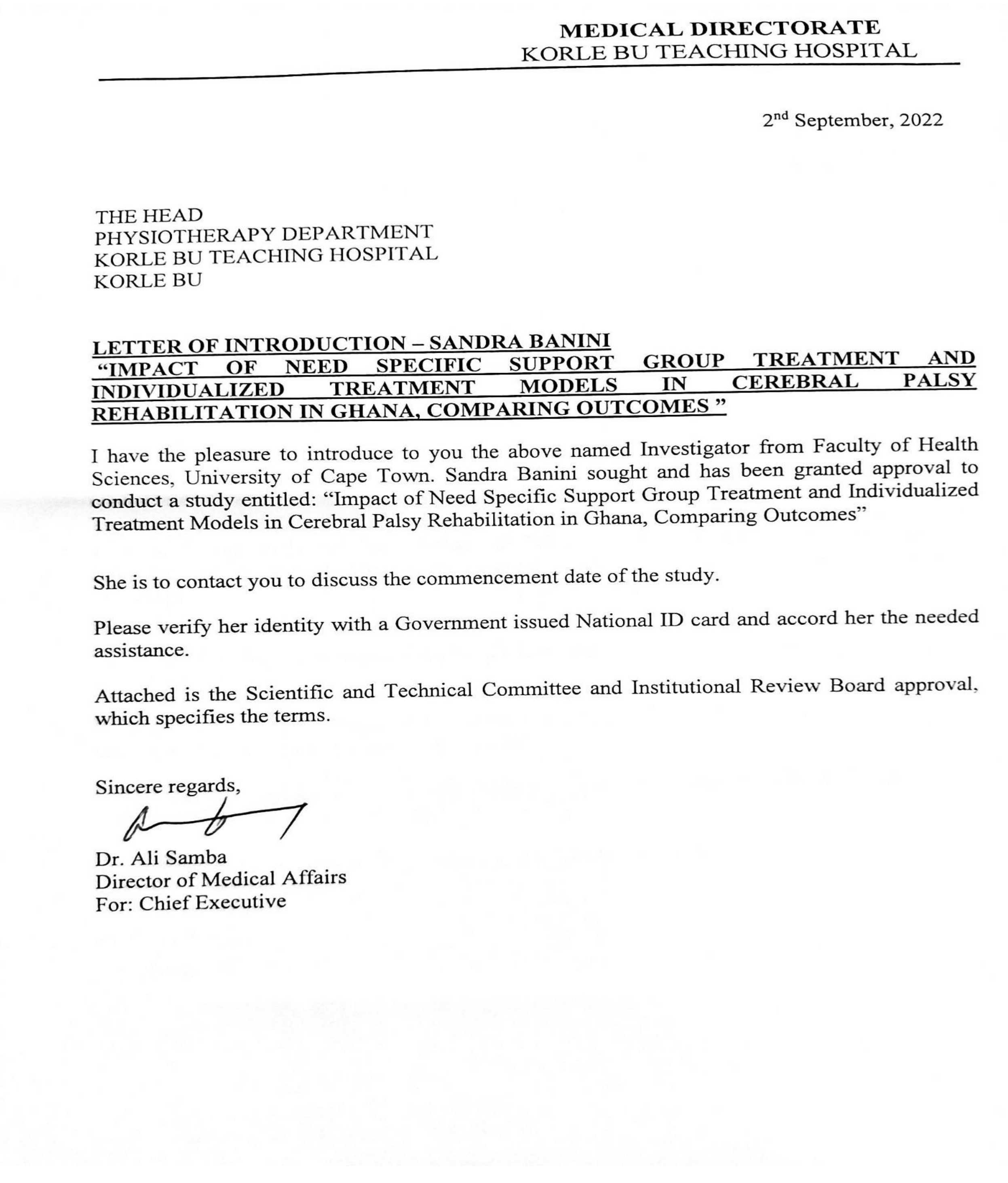
Please contact the Head of Department to discuss the commencement date of the study.

Please note that, this institutional approval is rendered invalid if the terms of the Institutional Reviewed Board/Scientific and Technical Committee approval are violated.

Sincere regards,

Dr. Ali Samba
Director of Medical Affairs
For: Chief Executive

APPENDIX 20: Letter of Introduction to Head of Department Korle-BU teaching Hospital.



MEDICAL DIRECTORATE
KORLE BU TEACHING HOSPITAL

2nd September, 2022

THE HEAD
PHYSIOTHERAPY DEPARTMENT
KORLE BU TEACHING HOSPITAL
KORLE BU

LETTER OF INTRODUCTION – SANDRA BANINI
"IMPACT OF NEED SPECIFIC SUPPORT GROUP TREATMENT AND INDIVIDUALIZED TREATMENT MODELS IN CEREBRAL PALSY REHABILITATION IN GHANA, COMPARING OUTCOMES "

I have the pleasure to introduce to you the above named Investigator from Faculty of Health Sciences, University of Cape Town. Sandra Banini sought and has been granted approval to conduct a study entitled: "Impact of Need Specific Support Group Treatment and Individualized Treatment Models in Cerebral Palsy Rehabilitation in Ghana, Comparing Outcomes"

She is to contact you to discuss the commencement date of the study.

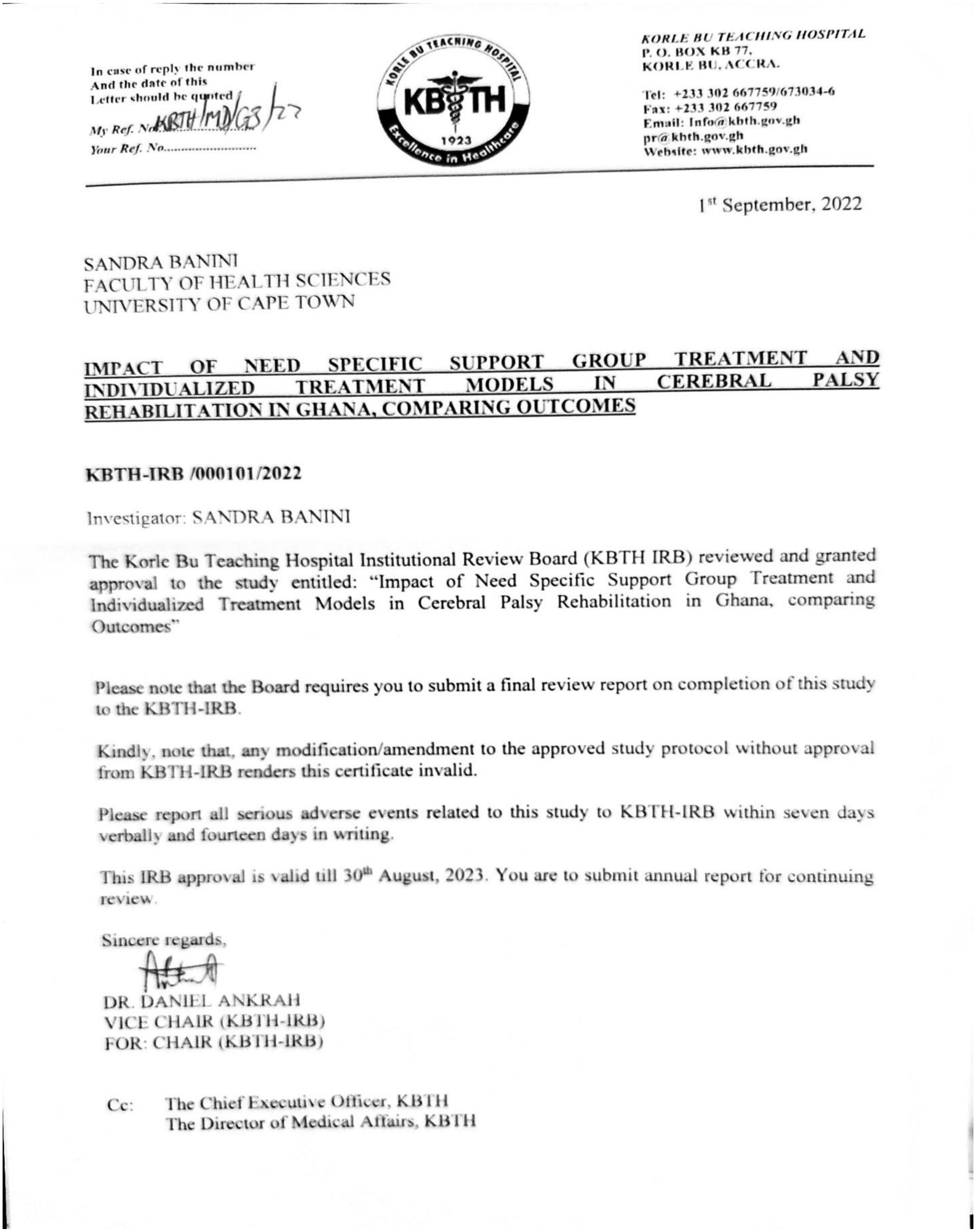
Please verify her identity with a Government issued National ID card and accord her the needed assistance.

Attached is the Scientific and Technical Committee and Institutional Review Board approval, which specifies the terms.

Sincere regards,

Dr. Ali Samba
Director of Medical Affairs
For: Chief Executive

APPENDIX 21:ETHICAL APPROVAL LETTER (2) FROM THE KORLE-BU TEACHING HOSPITAL.



In case of reply the number
And the date of this
Letter should be quoted
My Ref. No. KBTH/MD/G3/27
Your Ref. No..........................

KORLE BU TEACHING HOSPITAL
P. O. BOX KB 77,
KORLE BU, ACCRA.

Tel: +233 302 667759/673034-6
Fax: +233 302 667759
Email: Info@kbth.gov.gh
pr@kbth.gov.gh
Website: www.kbth.gov.gh

1st September, 2022

SANDRA BANINI
FACULTY OF HEALTH SCIENCES
UNIVERSITY OF CAPE TOWN

IMPACT OF NEED SPECIFIC SUPPORT GROUP TREATMENT AND INDIVIDUALIZED TREATMENT MODELS IN CEREBRAL PALSY REHABILITATION IN GHANA, COMPARING OUTCOMES

KBTH-IRB /000101/2022

Investigator: SANDRA BANINI

The Korle Bu Teaching Hospital Institutional Review Board (KBTH IRB) reviewed and granted approval to the study entitled: "Impact of Need Specific Support Group Treatment and Individualized Treatment Models in Cerebral Palsy Rehabilitation in Ghana, comparing Outcomes"

Please note that the Board requires you to submit a final review report on completion of this study to the KBTH-IRB.

Kindly, note that, any modification/amendment to the approved study protocol without approval from KBTH-IRB renders this certificate invalid.

Please report all serious adverse events related to this study to KBTH-IRB within seven days verbally and fourteen days in writing.

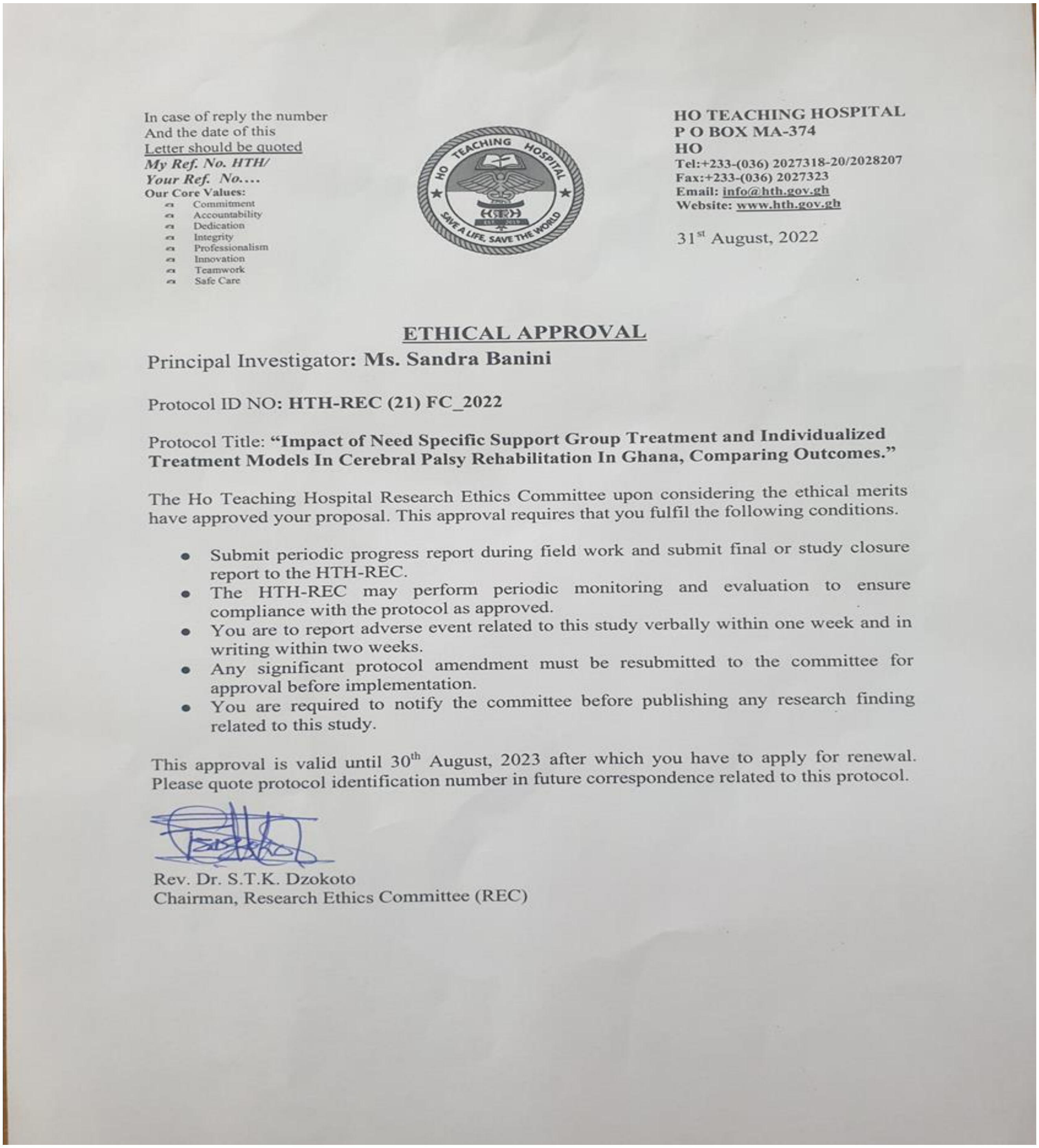
This IRB approval is valid till 30th August, 2023. You are to submit annual report for continuing review.

Sincere regards,

DR. DANIEL ANKRAH
VICE CHAIR (KBTH-IRB)
FOR: CHAIR (KBTH-IRB)

Cc: The Chief Executive Officer, KBTH
The Director of Medical Affairs, KBTH

APPENDIX 22: ETHICAL APPROVAL LETTER FROM HO TEACHING TEACHING HOSPITAL, GHANA.



In case of reply the number
And the date of this
Letter should be quoted
My Ref. No. HTH/
Your Ref. No....
Our Core Values:

- Commitment
- Accountability
- Dedication
- Integrity
- Professionalism
- Innovation
- Teamwork
- Safe Care

HO TEACHING HOSPITAL
P O BOX MA-374
HO
Tel:+233-(036) 2027318-20/2028207
Fax:+233-(036) 2027323
Email: info@hth.gov.gh
Website: www.hth.gov.gh

31st August, 2022

ETHICAL APPROVAL

Principal Investigator: **Ms. Sandra Banini**

Protocol ID NO: **HTH-REC (21) FC_2022**

Protocol Title: **"Impact of Need Specific Support Group Treatment and Individualized Treatment Models In Cerebral Palsy Rehabilitation In Ghana, Comparing Outcomes."**

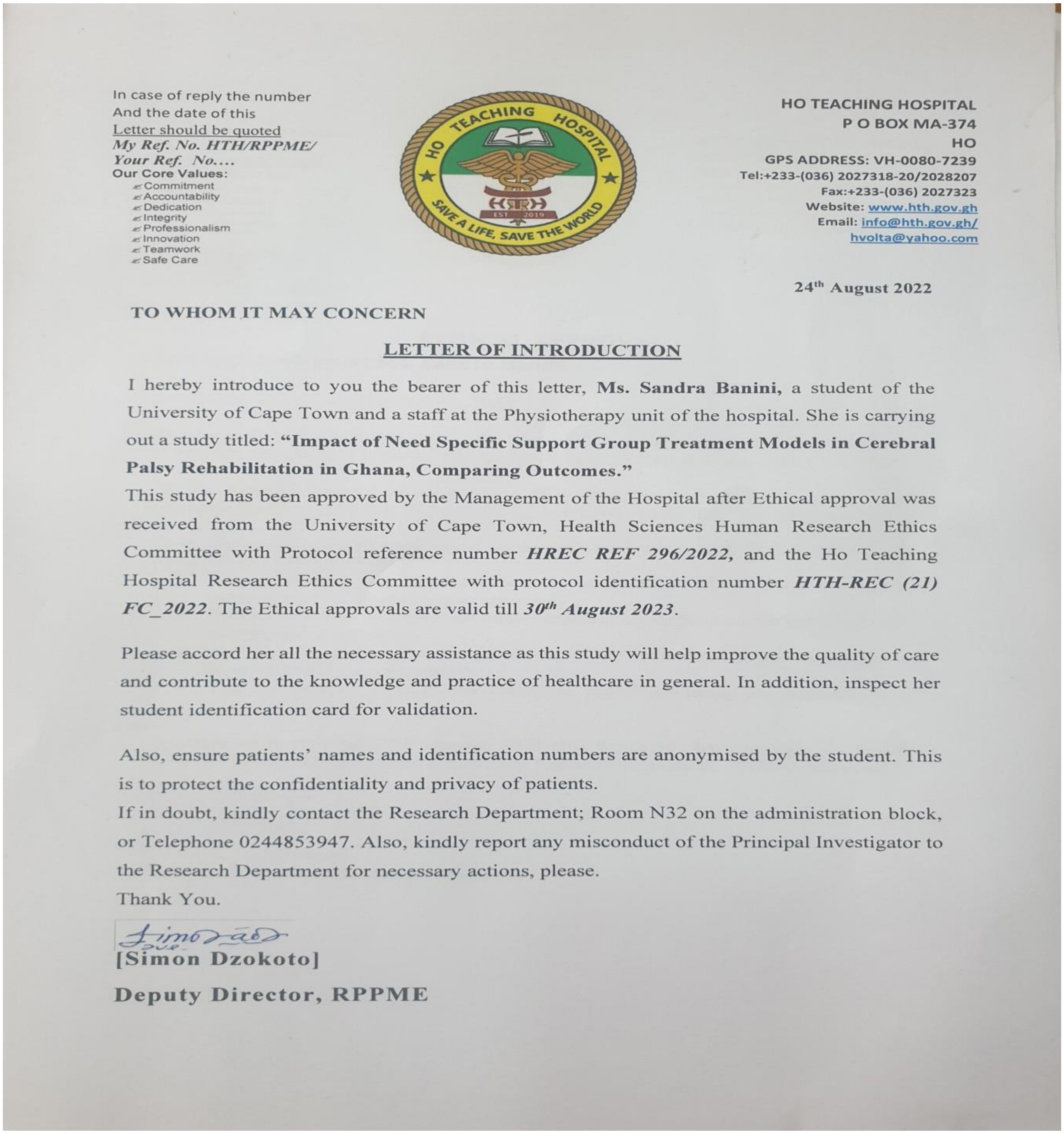
The Ho Teaching Hospital Research Ethics Committee upon considering the ethical merits have approved your proposal. This approval requires that you fulfil the following conditions.

- Submit periodic progress report during field work and submit final or study closure report to the HTH-REC.
- The HTH-REC may perform periodic monitoring and evaluation to ensure compliance with the protocol as approved.
- You are to report adverse event related to this study verbally within one week and in writing within two weeks.
- Any significant protocol amendment must be resubmitted to the committee for approval before implementation.
- You are required to notify the committee before publishing any research finding related to this study.

This approval is valid until 30th August, 2023 after which you have to apply for renewal. Please quote protocol identification number in future correspondence related to this protocol.

Rev. Dr. S.T.K. Dzokoto
Chairman, Research Ethics Committee (REC)

APPENDIX 23: LETTER OF INTRODUCTION TO THE HEAD OF PHYSIOTHERAPY DEPARTMENT.



In case of reply the number
And the date of this
Letter should be quoted
My Ref. No. HTH/RPPME/
Your Ref. No....
Our Core Values:
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- Accountability
- Dedication
- Integrity
- Professionalism
- Innovation
- Teamwork
- Safe Care

HO TEACHING HOSPITAL
P O BOX MA-374
HO
GPS ADDRESS: VH-0080-7239
Tel:+233-(036) 2027318-20/2028207
Fax:+233-(036) 2027323
Website: www.hth.gov.gh
Email: info@hth.gov.gh/
hvolta@yahoo.com

24th August 2022

TO WHOM IT MAY CONCERN

LETTER OF INTRODUCTION

I hereby introduce to you the bearer of this letter, **Ms. Sandra Banini,** a student of the University of Cape Town and a staff at the Physiotherapy unit of the hospital. She is carrying out a study titled: **"Impact of Need Specific Support Group Treatment Models in Cerebral Palsy Rehabilitation in Ghana, Comparing Outcomes."**

This study has been approved by the Management of the Hospital after Ethical approval was received from the University of Cape Town, Health Sciences Human Research Ethics Committee with Protocol reference number ***HREC REF 296/2022,*** and the Ho Teaching Hospital Research Ethics Committee with protocol identification number ***HTH-REC (21) FC_2022***. The Ethical approvals are valid till ***30th August 2023***.

Please accord her all the necessary assistance as this study will help improve the quality of care and contribute to the knowledge and practice of healthcare in general. In addition, inspect her student identification card for validation.

Also, ensure patients' names and identification numbers are anonymised by the student. This is to protect the confidentiality and privacy of patients.

If in doubt, kindly contact the Research Department; Room N32 on the administration block, or Telephone 0244853947. Also, kindly report any misconduct of the Principal Investigator to the Research Department for necessary actions, please.

Thank You.

[Simon Dzokoto]

Deputy Director, RPPME

APPENDIX 24: PRE-INTERVENTION EXPERIENCE OF THE RESEARCHER

At the proposal formation stage, a budget for the research was drawn with the timelines to guide the researcher during the data collection phase. The tables below show the budget and timelines drawn for the project.

Attachment 24.1: Timelines of the study

	TASK MODE	TASK NAME	DURATION (in days)	START	FINISH
1	COMPLETED	Start drafting the Proposal	149	18/2/2021	16/7/2021
2	COMPLETED	Presentation to UCT DHRS	0	5/8/2021	5/8/2021
3	COMPLETED	Corrections to Proposal after Presentation	32	6/8/2021	6/9/2021
4	COMPLETED	Submission of Proposal for Departmental and Divisional Review	0	7/9/2021	7/9/2021
5	COMPLETED	STEP 1 Rebuttal Review feed back	49	7/9/2021	25/10/2021
6	COMPLETED	Corrections to Step 1 DHRS Review	48	26/10/2021	12/12/2021
7	COMPLETED	Submission for Step 2 DHRS Review	0	13/12/2021	13/12/2021
8	COMPLETED	STEP 2 Rebuttal Review feed back		13/12/2021	27/4/2022
9	COMPLETED	Submission of proposal for ethical Clearance from HREC	0	24/5/2022	24/5/2022
10	COMPLETED	Ethical Permission from Korle-bu Teaching Hospital	76	19/4/2022	2/9/2022
11	COMPLETED	Ethical Permission from Ho Teaching Hospital	75	7/4/2022	24/8/2022
12	COMPLETED	Meeting with participating Physiotherapists in Korle-bu Teaching Hospital	0	25/8/2022	25/8/2022
13	COMPLETED	Meeting with participating Physiotherapists at Ho Teaching Hospital	0	24/8/2022	24/8/2022
14	COMPLETED	Trial run/Pilot study at both Hospitals	10	5/9/2022	9/9/2022
15	COMPLETED	Baseline testing for Korle-bu Teaching Hospital	8	15/9/2022	22/9/2022
16	COMPLETED	Baseline testing for Ho Teaching Hospital	9	12/9/2022	20/9/2022
17	COMPLETED	Three months treatment in Korle-bu Teaching Hospital	93	22/9/2022	22/12/2023
18	COMPLETED	Three months treatment in Ho Teaching Hospital	92	20/9/2022	20/12/2023
19	COMPLETED	End line Study Korle-bu Teaching Hospital	32	15/12/2022	22/12/2022
20	COMPLETED	End line Study Ho Teaching Hospital	32	12/12/2022	20/12/2022
21	COMPLETED	Data analysis and final submission	19	13/3/2023	31/7/2023
22	COMPLETED	Complete project and HREC study closure report submitted.	0	31/7/2023	30/8/2023

Attachment 24. 2: Budget of the study

Cost Centre	Budget/GH cedis
Travel Costs	
- Petrol compensation to Korle-bu Teaching Hospital	500
- Petrol compensation to Ho Teaching Hospital	200
Printing of outcome measures, questionnaires and informed consent forms	500
- Accommodation+ cost of living expenses in Accra for 1 month	1000
Meeting with therapists for Hospitals A and B;	
- A. Teaching materials	200
- B. refreshment and lunch	400
Cost of research assistant	1000
Cost of Ethical Clearance from Korle-bu and Ho Teaching Hospitals	1000
Cost of calls and Internet	200
GRAND TOTAL	5000

Before the proposal was sent for ethical clearance at the Health and Rehabilitation Sciences Ethical committee, it was presented at the physiotherapy division for assessment and evaluation on the 5th August, 2021. At this point, suggestions were made for improving the clarity of the proposal before it was submitted to the Department of Health and Rehabilitation Science. These suggestions included a few changes to the methodology and providing clarity on the proposed initiatives. Additionally, specific criteria for evaluating the success of the proposal were also outlined.

After this, the proposal was submitted for DHRS Rebuttal Step 1 submission on the 6th September, 2021 and feedback was received on the 12th October, 2021. A rebuttal step 2 was sent on the 13th December, 2021 for the final corrections and the proposal was accepted on the 26th April, 2022. The duration for the application, rebuttal process and final response was 3 months 9 days.

Ethical Clearance

There was an extensive rebuttal process to both Hospital Research Ethics boards which required changes to the proposal Ethical Clearances were sought from Faculty of Health and Rehabilitation Sciences Ethical Committee (HREC), University of Cape Town, South Africa, on the 13th May, 2022. Subsequently, HREC approved on the 22nd August, 2022 with UCT HREC No. 296/2022. (Appendix 15). An application for Ethical Approval was sent to each Hospital separately since there was a delay in response from HREC. The two Research Ethics committee boards in Ghana for Korle-bu and Ho Teaching Hospitals received their ethics applications on the 4th June, 2022 and 6th July, 2022 respectively. These committees gave separate feedbacks and the Researcher responded to all their comments appropriately. The final Ethics approvals for Ho Teaching Hospital and Korle-bu Teaching Hospital given on the 31st August and 2nd September, 2022 correspondingly (Appendix 16 and 17).

The questionnaire translation to local languages - Twi and Ewe.

The waiting period for ethical approval response was used productively to translate English questionnaires to local Ghanaian languages. The translators were given the copies of the questionnaires in English to translate into Twi and Ewe. The process of translations from English to the two languages was quite a challenging task since the translators were not readily available but after an extensive search, both languages were finally translated by people who could read and write the languages. However, there are few professionals who could do written translation, especially for the Asante Twi version which was chosen because it is the most popular language in Ghana. All of these professional translators contracted had experience of formally teaching these languages.

After this process, the questionnaires were taken through a forward translation where caregivers of children with other conditions other than cerebral palsy were asked questions. The Twi questionnaires were quite easy to translate, read and interpret compared to the Ewe. With the Ewe questionnaires, the translator was present while administering it to the caregivers and helped in further explaining certain vocabularies. The test participants also had the opportunity to offer suggestions of vocabularies to the interpreter while the questions were asked. All corrections from 10 tests for the Twi and 5 tests for the Ewe participants were sent back to another group of translators –different from the first group - who **could read and write** the local languages for reverse translation to English. These translators had to be different from the initial translators because they had to **proof read the documents and confirm** the questionnaires had the right intended context. The translators were contacted through calls and documents exchanged via email. A few ambiguities were identified for both questionnaires and then corrected by the first translators at the meeting with the committee of experts. The whole process of translation was very rigorous but the aim of finally translating the questionnaires was achieved.

Pilot study

It was during this period that the questionnaires were tested for its validity and an initial inter-rater reliability between the researcher and the research assistant for the outcome measure GMFM-88 was tested. Even though, the researcher measured all the pre GMFM-88 for both Hospitals therefore the inter-rater reliability test was not really necessary. However, it had to be displayed since it was done on 2 test participants during the pilot study.

Lessons learnt from the pilot study helped in informing the researcher on what how to organize the data collection process at the two facilities. It also informed the researcher on which roles to assign to the research assistant.

A research assistant was trained during the pilot study period to independently perform specific tasks during data collection (see Table 1). The following were the roles assigned to both the researcher and research assistant.

Attachment 24.3: Summary of roles of the researcher and research assistant

The role of the researcher and researcher	**The role of the researcher and research assistant**
Budget planning and drawing of time lines. Organize a committee of experts to look into the final translations to fit the right context with minimal corrections. Teach research assistant on the purpose of the research and train her on how to fill the demographic data and administer the questionnaires in Ewe and Twi. Organize a meeting with Physiotherapists at Korle-bu and Ho Teaching Hospitals to explain the purpose of study and their role in the study. Recruit participants and their caregivers for the study at both Hospitals. Seek consent from Caregivers and Assent from Participants from both Hospitals before baseline measurements are taken. Administer the caregiver questionnaires at Korle-bu and Ho Teaching Hospitals. Also, complete the Outcome measures for each participant at both Hospitals. Documentation of demographic data of participants at both facilities. Documentation of attendance at Korle-bu Teaching Hospital with reasons for non-attendance through regular reminders of Physiotherapists in Korle-bu Teaching Hospital to ask caregivers reasons for non-attendance of caregivers on their next visit. Data collection and data entry into Excel Scanning of questionnaires onto one drive Data Analysis Interpretation of the results and discussion Dissemination of research findings Publication of research.	Schedule and conduct interviews for caregivers. Select a place to conduct the interviews Assist in recruitment of participants by entering demographic details of participants. Summarize interviews Assist in data collection and data entry onto Excel. Maintain quality standard to preserve the integrity of data and findings Assist in writing a report or summarize data and implications of the results Attend scheduled meetings with researcher and supervisors. Assist in the scanning of Questionnaires onto one drive. Assisting in documentation of the daily attendance at Ho Teaching Hospital and reasons for non-attendance.

Researchers Lessons learnt from the pilot study;

- The pilot study was done at both facilities. This gave the researcher the opportunity to know where and when to organize the interview. Furthermore, the researcher and research assistant had the opportunity to rehearse the whole recruitment and interview process before the main study begun.
- During this period, the researcher was able to find suitable locations for the recruitment and interview.
- It offered the researcher and research assistant the opportunity to learn how to read the translated questionnaires using the right vocabularies.
- The researcher received corrections to the first versions of the translated uestinnaires during this period.
- During the pilot study the researcher learned how to combine the process of recruitment with the normal routine treatment sessions at the various facilities.

Testing the translated questionnaires

This was done through a forward and backward translation to check the validity as explained above. It also included the calculation of the reliability or Cronbach's alpha which was used to check the internal consistency of the translated questionnaires. The translations were tested on 10 Twi and 5 Ewe participants. Prior to testing, the participants consent was acquired to help the researcher translate the questionnaires and identify statements that were unclear. Some caregivers even gave suggestions to better frame some questions into context. The following were the results of the reliability using SPSS (version 26). The following were the reliability results of the translated questionnaires;

RELIABILITY TESTING OF THE QUESTIONNAIRES

1. RELIABILITY OF TWI QUESTIONNAIRES AFTER VALIDATION.

After a forward and backward translation of the Twi/Ewe questionnaires, a committee of experts were also consulted to help effect the necessary changes to attain a better translation in the right context. The questionnaires involved one qualitative data (Health Related Quality of Life Questions with a measure of the caregiver's state of Health Quantified) and two other quantitative data (Modified Caregiver Strain Index and the Medrisk Satisfaction with Physical Therapy).

The qualitative data were reviewed by a committee of experts which involved the translators, therapists and the researcher. The committee reviewed and corrected the aspects of the translated questionnaires that the test sample found difficult understanding in order to fit the right context. Finally, the questionnaires re-administered to achieve the following results.

The reliability of the health-related quality of Life was not calculated since it was a qualitative data and just the process of validation through translation was enough.

Also, the inter-rater reliability or Cohen's Kappa of the GMFM-88 was calculated for two patients between the researcher and research assistant. Even though the inter-rater reliability was calculated, the Researcher was the one who measured the GMFM-88 at both facilities. All the above analysis was done with SPSS version 26.

Attachment 24.4: Inter-Rater validity of GMFM-88 for the first patient as shown below

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.493[a]	.317	.636	2.942	87	87	.000
Average Measures	.660[c]	.481	.777	2.942	87	87	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Attachment 24.5: Inter-Rater validity of GMFM-88 for the second patient was as follows

Intraclass Correlation Coefficient							
	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.685[a]	.555	.781	5.340	87	87	.000
Average Measures	.813[c]	.714	.877	5.340	87	87	.000
Two-way mixed effects model where people effects are random and measures effects are fixed.							
a. The estimator is the same, whether the interaction effect is present or not.							
b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.							
c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.							

Interpretation: The measurement of the internal consistency or reliability of the items within a scale is called Cronbach's alpha. It usually ranges between 0 and 1. Therefore the closer the Cronbach's Alpha value is to 1, the greater the internal consistency of the items in the scale (Gliem & Gliem, 2003; Taber, 2018). Meaning, the values obtained for the Twi and Ewe versions as shown in the tables above reveal a greater internal consistency between the items in the scale or translated questionnaires.

In addition, the measure of the inter-rater reliability is called Cohen's kappa (McHugh, 2012). Its interpretations are as follows values ≤ 0 show no agreement between raters, values 0.01-0.2 ,show slight agreement, values of 0.21-0.4 indicate fair agreement, values of 0.41-0.60 interpreted as moderate agreement and finally values of 0.61-0.80 as substantial agreement and values of 0.81-1.00 as almost perfect agreement (McHugh, 2012) . The inter-rater reliability results as seen above values were 0.661 (~0.7) and 0.813 (~0.8) using SPSS version 26. Meaning there was a substantial agreement between raters.

Attachment 24.6: Reliability of Caregiver questionnaires in Twi for the 10 participants

Type of Questionnaire	Cronbach's Alpha Value
1. Modified Caregiver Strain Index	0.857
2. Medrisk Satisfaction with Physical Therapy Questionnaire	0.911

Attachment 24.7: Reliability of Caregiver questionnaires in Ewe for 5 participants.

Type of Questionnaire	Cronbach's Alpha Value
1. Modified Caregiver Strain Index	0.760
2. Medrisk Satisfaction with Physical Therapy Questionnaire	0.926

The reliability of the health-related quality of Life was not calculated since it was a qualitative data and just the process of validation through translation was enough.

Also, the inter-rater reliability or Cohen's Kappa of the GMFM-88 was calculated for two patients between the researcher and research assistant. Even though the inter-rater reliability was calculated, the Researcher was the one who measured the GMFM-88 at both facilities. All the above analysis was done with SPSS version 26.

Interpretation: The measurement of the internal consistency or reliability of the items within a scale is called Cronbach's alpha. It usually ranges between 0 and 1. Therefore the closer the Cronbach's Alpha value is to 1, the greater the internal consistency of the items in the scale (Gliem & Gliem, 2003; Taber, 2018). Meaning, the values obtained for the Twi and Ewe versions as shown in the tables above reveal a greater internal consistency between the items in the scale or translated questionnaires.

In addition, the measure of the inter-rater reliability is called Cohen's kappa (McHugh, 2012). Its interpretations are as follows values ≤ 0 show no agreement between raters, values 0.01-0.2 ,show slight agreement, values of 0.21-0.4 indicate fair agreement, values of 0.41-0.60 interpreted as moderate agreement and finally values of 0.61-0.80 as substantial agreement and values of 0.81-1.00 as almost perfect agreement (McHugh, 2012) . The inter-rater reliability results as seen above values were 0.661 (~0.7) and 0.813 (~0.8) using SPSS version 26. Meaning there was a substantial agreement between raters.

Meeting with the Physiotherapists at both Hospitals.

Multiple face- to- face meetings were held with the Researcher, research assistant and Physiotherapists at the two Hospitals Physiotherapy Departments to explain the purpose of the research and each person's role in the study. Physiotherapists in Korle-bu Teaching Hospital, who were practicing the individualized therapy were really happy about the study and asked questions about the group therapy model. They were thrilled by the fact that it solved their challenge of large number of case load and also getting the caregivers actively involved in therapy. In addition, their cases were seen once a week, once every 2 weeks and once a month depending on the level of recovery of the patients. Therefore, empowering the caregivers was very important since it helps the caregivers learn how some of the treatments were administered. The therapists were encouraged to continue their usual therapy and not make any changes to treatment procedures until the study was over. Physiotherapists in Ho Teaching Hospital, mainly based their questions on the methodology and how the recruitment process will be done. They were also responsive and were also told not to make changes during their treatment procedures (see fig 18.2 and 18.3 in Appendix 18).

Recruitment and Baseline measurements

The recruitment and preliminary data collection started from the 15th September, 2022 at Ho Teaching Hospital and 19th September, 2022 for Korle-bu Teaching Hospital. The researcher travelled back and forth by road in other to meet participants for recruitment at the two Hospitals. The average distance between the two facilities was 168.9km which was about 4-hour drive. The researcher visited both hospitals during the recruitment period and identified children with Spastic Cerebral Palsy (CP) who qualified for inclusion into the study, from the medical records or registries. These children and their regular caregivers were recruited in a face-to-face interview by the researcher and research assistant at both hospitals, during their usual physiotherapy visit, in a private room. The purpose of the research and their participation was explained to them and they were told to keep all information obtained from the research confidential. They were then given an informed consent form to sign for their participation and on behalf of the children. For those who did not speak English, it was translated in their home languages (Ewe and Twi), before signing. Assent was sought from children with appropriate cognitive functioning, as they are expected to understand the concept. Children with CP who were well orientated to time and place, payed attention, understood the concept of informed assent, and remembered what was explained, had their informed assent taken by the researcher. At this point, the participant's demographic data was obtained by the researcher and research assistant. Furthermore, the researcher filled outcome measurements of the functional assessment of the participants (Children with Cerebral palsy) at both Hospitals and administered the questionnaires for the caregivers at Korle-bu Teaching Hospital. The Research Assistant also assisted the researcher to administer the caregiver questionnaires in Ho Teaching Hospital (fig 18.4). Later, all the raw data collected were scanned and stored on a private cloud storage (One drive).

Recruitment and baseline measurement taking at both Hospitals were carried out over a period of 2 weeks and lasted 95 minutes per participant. The average number of participants gotten each day was 6 for Korle-bu Teaching Hospital and 7 for Ho Teaching Hospital. It was possible to take the data during this period because both Hospitals had high **average daily attendance** in the month of September. The hardcopies of the questionnaires were also stored in a safe locker at both Hospitals.

Intervention

At Korle-bu Teaching Hospital, patients were seen and treated on a mat, by the wall bar, staircase or using walkers to train gait etc depending on the goals of the therapist. The children were treated by the therapist and the caregivers sat in to watch the sessions. Also, their treatment goals were individualized and caregivers are taught home exercises as well. Treatment interventions used here during therapy were massage, passive mobilisations, neck control/trunk control exercises, rolling exercises, sitting exercises, standing exercises and walking exercises, stair case climbing exercises, lower limb strengthening exercises, 4-point kneeling exercises, transitional exercises (eg. From lying to sitting, sitting to standing or standing to walking) etc. Materials used here are the mat, wall bars, staircase, wooden walkers, foam rollers, medicine ball, toys, parallel bar, standers, wedge, corner seats, wooden seats, etc. These therapies are family centered and particularly tailored to achieving the child’s ability to achieve a developmental milestone. Goals are developed on short term basis and clients are reviewed from time to time and their goals are changed as the progress until their long-term goals are achieved. Once their assessment, treatment plan and treatment for each child is documented, their treatment can be handled by another therapist in the paediatric team (see fig 18.6 and 18.7 in Appendix 18).

At Ho Teaching Hospital, it’s a different story, patients are seen in groups on a mat like a mini class session involving the therapist and caregivers of the children with CP. Children whose treatment goals are similar are seen in groups whilst undergoing treatment and the therapist focuses on teaching the caregivers how to handle the children while performing their various treatment. Their exercises are done on the mat, on the exercise ball, at the parallel bar, by the table, or using the hoists, staircase or the treadmill depending on the goal that is need to be achieved for those patients. Therapists here follow a standardized protocol designed for rehabilitation in each group. All therapies begin with massage and passive mobilisations to relax spastic muscles. Once their assessment of the Children was done, they were assigned groups based on the specific goals the therapists want to achieve and their treatment can be handled by any other therapist in the paediatric team.

Steps to be taken for the post measurement.

The researcher has put in place the following measures to ensure that the end line data will be taken as planned in December. To ensure that most of the participants come for the end line data to be taken, the researcher called most of the participants before the due date to find how their children were doing and also remind come for their data to be taken.

To conclude, the preliminary data went well so far, we are currently waiting to the last data collection which will be done in the 15th December, 2022.

Attachment 24.8: Timeline of pre measurement period

Phase	Task mode	Start date	End date
Ethics rebuttals	Completed	13th May, 2022	2nd September, 2022
Trial period	Completed	5th September, 2022	14th September,2022
Baseline measurements Phase	Completed	12th September, 2022	22nd September, 2022
Experimental phase	In progress	22nd September, 2022	15th December, 2022
Post Treatment Measurement Phase	Not started	12th September, 2022	22nd September,2022

Signature:

Barry

Date: 17/11/22

APPENDIX 25: POST-INTERVENTION EXPERIENCE OF THE RESEARCHER

The post-measurement period began after the three-month treatment period which started on the 12th of December 2022, and to the 23rd of December 2022. The study was conducted to mimic what happens on a normal day at the various teaching Hospitals. There were no changes to the type of treatment the participants received over the 3-month period. Caregivers from both facilities were contacted by phone before the period commenced as a reminder to book appointments for taking the post-measurements. The researcher did not only call to remind them of their appointments but also showed genuine concern by asking them about the progress of their children. Again, the researcher travelled back and forth twice within the two weeks, to take the measurements at the two hospitals. The researcher was assisted by the research assistant in filling out the caregiver questionnaires at Ho Teaching Hospital. In addition, all the functional outcome measures such as the GMFM-88, MACS and GMFCS at both hospitals were conducted by the researcher. Also, in Korle-bu Teaching Hospital, all the functional outcomes and caregiver questionnaires were completed by the researcher.

Treatment Models

Participants in Korle-bu Teaching Hospital had the individualized treatment model and those in Ho Teaching Hospital, had the need-specific grouped treatment model. Teaching Korle-bu Teaching Hospital, the Korle-bu Teaching Hospital, is a major referral hospital in urban city of Accra, Ghana and it receives patients from the various regions nationwide. From the demographic data collected, most of the participants are from the urban setting. Children with CP including Spastic CP are treated at the physiotherapy unit by qualified therapists, in one-to-one, individualised treatment sessions.

Ho Teaching Hospital is the Ho Teaching Hospital, which is also a main referral hospital located in the Ho municipality. Even though the Ho municipality is the capital city of the Volta region, patients come from rural areas around the Ho municipality come to the Ho Teaching Hospital for treatment eg. Areas in Volta, some parts of Eastern and Oti regions of Ghana. This was confirmed from the demographics collected during the study since most of the participants came from the surrounding rural areas around Ho. The physiotherapy department is where children with CP get expert physical therapy consults. Children with similar clinical presentations and characteristics are assigned to small group of three children with their caregivers, after their first assessment.

Individualized treatment Model

A total of 22 caregivers were receiving individual treatment at Korle-bu Teaching Hospital consented to baseline measurements, however only 17 caregivers reported for their post-measurements. Out of the remaining 5, 2 of the caregivers were so busy at work and could not make time to come for the post-measurement and the last participant was unreachable by phone call. Also, one of the participants passed away. This happened when the traveled with his caregiver to their hometown in the Western Region of Ghana. According to the mother, the boy fell ill and was taken to the nearest clinic for treatment. A few days later, the child's condition worsened, so the caregiver decided to return to Accra. On their way back, she realized her son was having difficulty in breathing and consequently, reported to the Korle-bu Teaching Hospital where the child was resuscitated and put on supplementary oxygen on account of Pneumonia. The boy died 2 weeks before the scheduled final measurement time. The remaining participant (child and caregiver) from Korle-bu Teaching Hospital, travelled to the Ho for the Holidays and was referred to come for treatment at Ho Teaching Hospital for a month. They later returned to Korle-bu Teaching Hospital before the Christmas season to continue their therapy. This caregiver experienced both the individual and group treatment models. Therefore, the participant’s post-measurement information was excluded.

Grouped treatment Model

Out of the 28 participants received the grouped therapy model who consented for the initial reading at Ho Teaching Hospital, 23 participants reported for their post-measurements. The 5 remaining caregivers did not come for their post-measurements. Out of the 5, 3 complained that where they stayed was very far and the newly increased cost of transportation was too much for them. One participant said she was seriously ill; the other caregiver said her daughter was ill. These participants could not make it for the post-measurement

In summary, 17 participants who had the individualized treatment model made it for the post-measurement at Korle-bu Teaching Hospital and 23 participants who had the grouped treatment model, came for the final measurements at Ho Teaching Hospital as shown in the flow chart below (Fig 1).

Caregiver Questionnaires

The following was general feedback that came up while filling out the caregiver questionnaires at both hospitals;

- **Burden of Care**

The care giver strain index consists of 13 sub- questions asking how stressed the care giver feels with regards to: employment, financial, physical, social and time. Answers “Yes, on a regular basis” =2, “Yes sometimes=1, No=0. A score of 7 or higher indicates a high level of stress. It has been validated and its reliability has been proven for caregivers of children with special needs especially cerebral palsy (Dambi & Jelsma, 2014b; Robinson, 1983). For the purpose of analysis, only participants who came for the post measurement period were considered.

Data entry and storage

All raw data collected was scanned and stored on private cloud storage (One drive). Hard copies of the outcome measures/ questionnaires completed by the researcher and therapist were stored in a locked cupboard at each hospital physiotherapy department. All participants were allocated a code, instead of a name, maintaining confidentiality and anonymity. All data was captured on a password-protected Excel spreadsheet (Microsoft Office Excel 2019) and cloud storage, only accessible by the researcher and supervisors. The hard copies of outcome measures and questionnaires will be kept in a locked cupboard in a secure office for 5 years after publication. Pre-test Data was entered as baseline measurements, after 3 months post-treatment for end-line information were captured. There were no differences in how the data was captured at the individualized treatment model and grouped treatment model. Uniformity was maintained in data collection with research assistant communication.

Attachment 25.1: Timeline of post measurement period

Phase	Task mode	Start date	End date
Ethics rebuttals	Completed	13th May 2022	2nd September 2022
Trial period	Completed	5th September 2022	14th September 2022
Pre-test Baseline measurements Phase	Completed	12th September 2022	22nd September 2022
Experimental phase	Completed	22nd September 2022	15th December 2022
Post-Treatment Measurement Phase	Completed	12th December 2022	22nd December 2022

Signature:

Date: 13/01/23

APPENDIX 26: PRE-DATA EXPERIENCE OF THE RESEARCH ASSISTANT

Name of Research Assistant: Maame Afua Quansah

Profession: Physiotherapist

Institution: Ho Teaching Hospital.

Roles for the Research Assistant: The following role were assigned to me during my briefing by the researcher during my briefing before the trial period**.**

- Schedule and conduct interviews for caregivers
- Select a place to conduct the interviews
- Assist in recruitment of participants by entering demographic details of participants.
- Summarize interviews
- Assist in data collection and data entry onto Excel.
- Maintain quality standard to preserve the integrity of data and findings
- Assist in writing a report or summarize data and implications of the results
- Attend scheduled meetings with researcher and supervisors.
- Assist in the scanning of Questionnaires onto one drive.
- Assisting in documentation of the daily attendance at Ho Teaching Hospital and reasons for non-attendance.

My role as a Research Assistant before the trial period where I was taught and trained by the researcher on my role in the research. Firstly, I was briefed on the purpose of the research and the later trained on how to fill the caregiver questionnaires and the functional outcome measures of the participants with Cerebral Palsy. I was also shown the translated questionnaires and taught to use certain vocabularies from the questionnaires while administering it in Ewe by observing an interview between the researcher and a caregiver. In addition to that, some of the participant caregivers understood English so I resorted to using English for further clarification on a few occasions. The translated questionnaires were practiced several times during the trial period hence there were no challenges while administering them for the study. There was only one caregiver who spoke Twi therefore, the Twi questionnaire was used only once.

The total number of participants recruited from the Ho Teaching Hospital were 30 and I assisted in administering the Caregiver Questionnaire both in English and Local Languages to participants. Some precautions taken during the interviews included, creating a good rapport with the caregivers to enable them open up freely with answers to the questions asked. In addition to that, good eye contact was maintained throughout the interviews to give them assurance of active listening from the interviewer.

Overall, participants were responsive. However, they were expecting immediate solutions to their problems in relation to questions asked in **appendix 6.** They were encouraged to have patience and await findings of the study. The aim of the research was also explained to their understanding.

Pertaining to some of the satisfaction questions, participants were initially afraid to provide honest answers. However, they were assured of confidentiality which made them feel free to say all that was on their mind.

Generally, a few matters that came up are discussed as follows;

First of all was marital issues, in that, a number of caregivers who happen to be the mothers of children with Cerebral palsy had been separated from their husbands because of the children's condition thus making life difficult for them. There was one experience where a caregiver who has four children, two of whom have cerebral palsy complained bitterly of her husband threatening to marry another woman if she does not agree to bear another child for him, despite the stress of handling two children with cerebral palsy.

Issues of abuse involving both mothers and the children also came up during the interviews. A mother shared an experience where she reported that the father of the child did not care about his son and beats him mercilessly when he misbehaves. She has therefore left the house, hence feels burdened in taking care of the boy amidst her illness. She got emotional and cried throughout the interview. She was referred to a counsellor afterwards for intervention.

Also, a number of caregivers reported facing rejection from their families as well as social stigmatization which was affecting the businesses of those working due to the fact that people refuse to patronize them because they are mothers of children with cerebral palsy. Another interesting revelation that came up was the fact that one caregiver reported that she felt at ease and much better about her situation when she comes to the hospital because she meets others who were in the same plight; as caregivers/mothers of children with cerebral palsy.

In summary, it was realized that the support systems for mothers who have children with cerebral palsy from the Government and Society were not strong in Ghana. Therefore, solutions have to be geared towards these above-mentioned support systems, most especially the family support system.

Signature:

Date: 18th November, 2022

APPENDIX 27: EXPERIENCE OF RESEARCH ASSISTANT- POST DATA PERIOD

Name: Maame Afua Quansah

Profession: Physiotherapist

Institution: Ho Teaching Hospital

At Ho Teaching Hospital, out of the 30 participants who were contacted by phone, 24 appeared for the post data measurements and the remaining 6 were either unreachable or did not come for the post data measurements due to circumstances beyond their control. 60% of the caregivers were consistent in making it to half of the expected 12 sessions during the 3-month period. The other 40% who were unable to come complained of how expensive it was to bring their child for treatment. Some expressed that they the caregivers were not feeling well hence could not bring their children for therapy. Others also had to go to work in order to gain some income to take care of their children and as a result had no time to bring their children for therapy.

My role as the research assistant during the post data measurement was not different from the pre-data collection period and they were as follows;

Schedule and conduct interviews for caregivers

While getting to the end of the 3-month period, all the caregivers at Hospitals A and B were called by phone and reminded of their final appointment for post data measurements. The interview date was specified for them. The schedules were given to coincide with their therapy appointments. Again, I assisted in administering the caregiver questionnaires in Ho Teaching Hospital in both English and the local language of the participants, same as was done during the pre-data measurements. Participants were very responsive since the questions they were being asked were familiar. They even took time to further explain some of the responses and all those extra information were noted.

Selection of a place to conduct the interviews

While the post data period was approaching, the therapists in charge of the pediatric units were informed of the date and time scheduled for the interviews. They offered a private room as done for the pre data period and the room was arranged for the interviews. When it was time for the scheduled appointment, care givers were called in one after the other for their interviews after undergoing their therapy sessions

Assist in recruitment of participants by entering demographic details of participants

The demographic information of the child and caregiver participants was recorded during the pre-data period and typed to an excel sheet, which was later placed onto a shared drive that was password-protected and to which only the researcher, supervisors, and I had online access. During the pre-data phase, participants who met the inclusion criteria were recruited, and the same subjects were contacted for measurements during the post-data period.

Summarize interviews

While filling the caregiver questionnaires, comments given by the caregivers were written down on their forms as additional information. These comments were summarized for each participant. The experiences documented in the pre-test interviews were similar to that of the post-test. The following were general issues that came up while filling the caregiver questionnaires for participants in Ho Teaching Hospital;

Few of the caregivers commented that their situation in handling their wards had become worse while most found no change. However, they generally agreed that their anxiety levels were better because of the encouragement they received in the hope that the treatments will help their wards get better as they gradually observed themselves. An observation by one caregiver was, “reduced rate of seizures in her ward and attributed it to consistency in treatment session”.

Also, two caregivers whose children were older and could ambulate with the aid of assistive devices had similar complains which were worth noting. They both said their children were not complying with home exercise program given and this made them tired as caregivers.

The pre-test comments from the caregivers regarding that most of these caregivers were single parents still stood out since they are left to cater for the general well-being of the children alone. Due to a lack of social support networks, these provide challenges as described in past reports.

General satisfaction to treatment and burden of care remained unchanged as in the previous observations with the caregivers. In contrast to this, was the increased difficulty in transportation due to harder economic conditions, which was experienced by the caregivers.

Assist in data collection and data entry onto excel

All the caregiver questionnaire responses and functional outcomes from the individual forms were typed into an excel sheet as done previously for the pre-data period. Following the participants' assent during the pre-data period, copies of the questionnaires and outcome measures were completed during the interview, and all data gathered from the interviews, including demographics, were input into Microsoft Excel. The questionnaires/outcome measures utilized for the interviews throughout the post-data phase were newly printed versions. All of the data was once more entered into Microsoft Excel right away after the interviews.

Maintain quality standard to preserve the integrity of data and findings

All information obtained from the interviews were documented as they were given and nothing else was added. The research assistant thoroughly inspected all the filled forms after the interviews to ensure there were no omissions. Patients whose information were not clear were given the opportunity to clarify themselves through further explanations. In summary, the data quality standard was also preserved by checking for accuracy in all data obtained before it was entered into the Microsoft excel database. Data was also updated after new interviews were held and also checked for accuracy.

Assist in writing a report or summarize data and implications of the results

I assisted in completing a report using research journal notes, and a verbal recalling of my experiences to the researcher during the pre /post data periods followed by written reports of all my experiences. In general, there were no differences in data collection during the post measurement period as compared to the pre-data period.

Attend scheduled meetings with the researcher and supervisors

Frequent meetings with the local and international supervisors were held every two weeks during the data collection period to keep them updated. Every meeting with the supervisors required the availability of a Microsoft Teams app downloaded and a steady internet/wifi connectivity used on the phone. All meetings were held on Microsoft Teams and recorded. During those meetings, the researcher gives detailed reports of the data collection procedures whiles guidance was given by the supervisors. There were no peculiar differences generally in how the data was taken during the pre and post measurement periods.

Assist in the scanning of Questionnaires onto One drive

I assisted by physically scanning/ taking images of the raw data of completed questionnaires. After the interviews, the raw data from the forms were scanned using a mobile scanner and was later uploaded onto a shared drive which is password protected, which only the researcher, supervisors and I had access to

Assist in documentation of the daily attendance at Ho Teaching Hospital and reasons for non-attendance

The attendance data was expected to reveal how the caregivers were attending their clinic on a normal day. All the names of the caregivers who were recruited for the study were given to the physiotherapist in charge of the pediatric unit, therefore any caregiver came with their child for treatment was noted by the therapist. The researcher or research assistant were notified with names of attendees at the close of the day. Attendance of the participants who came for treatment were noted (ticked) in the attendance table and the various treatment they received were also written underneath. Whenever a child failed to attend the clinic on their expected appointment, their names were noted by the therapist who then informed researcher or research assistant. On the child's next visit for therapy, the researcher was notified and reasons for non-attendance for the previous session was obtained from the caregiver and recorded.

The physical benefits of consistent treatment can be helpful to the caregiver, child and physiotherapist. For the child, there is a general improvement in function/activity and reduced incidence of complications. For the caregiver, it is important because it reduces the burden of care which later affects the quality of life of the caregiver. Finally, therapists benefit because they are able to track the progress of treatment when the patients come consistently.

Comparing the observations from the individualized treatment approach to the grouped treatment approach to treatment, all participants who came consistently for treatment had the above benefits however it seemed the consistency of participants who had the individualized therapy were very low as compared to the grouped therapy, even though all participants had the same challenges. Generally, there were minimal changes in function which was expected since the 3-month treatment duration was not very long to show significant changes. The differences in the caregiver satisfaction and burden of care for the various groups will be revealed in the analysis.

In conclusion, the overall emotional benefits of consistent group or individual treatment and care of children with CP were observed while filling the caregiver satisfaction questionnaires.

Date: 9th January, 2023

APPENDIX 28: REPORT ON THE MANAGEMENT OF CEREBRAL PALSY AT THE HO TEACHING HOSPITAL.

The paediatric unit of the Physiotherapy department has been in operation for 6 years and manages a range of paediatric conditions including Cerebral Palsy. The unit has 3 physiotherapists handling all the paediatric cases on out-patient and in-patient basis (Children's ward, Babies unit and the Neonatal Intensive care unit). Also, the unit receives an average weekly attendance of 25 children with Cerebral palsy. Cerebral palsy cases that report to this unit are seen in groups which are explained in the protocol below. Caregivers are given appointments to come at particular time for treatment. These treatment times are similar to other caregivers who are also in the same group. Treatment for children with cerebral palsy done on Tuesdays and Wednesdays. Groups 1 & 2 are seen on Tuesday and Groups 3 & 4 on Wednesdays. The main aim of the Group therapy is to engage the caregivers in treatment sessions and it lasts for about an hour.

The following are the goals of the group therapy;

- Enable the caregivers to understand the condition and learn from the therapist.
- Engage the caregivers in the treatment
- Give the caregivers the opportunity to learn about how to handle their children and carry out treatment at home by themselves
- Offer an opportunity for the carers to learn from each other and obtain support from their peers where necessary. This makes them feel encouraged that they are not alone in their situation.
- Social support

This report covers details of management and assessment protocols at the paediatric unit of the physiotherapy department at the Ho Teaching Hospital.

Assessment

Patients with cerebral palsy are assessed by initially gathering subjective data which is mainly bio psychosocial information, objective measurements and then categorizing patients into groups for therapy. Please find below a detailed assessment protocol:

A. SUBJECTIVE ASSESSMENT

1. Presenting Complain:

2. History of Presenting Complain:

Risk factors prenatal, perinatal and post-natal

Milestones

3. Past Medical History-

Mother:

Child:

4. Family and Social History:

Environmental factors

Physiological factors

B. OBJECTIVE ASSESSMENT

1. Observation

It involves assessing the child's Vision, Hearing, Cognition, Communication, Feeding and Behaviour

2. Reflexes

It involves assessing any of these reflexes Palmer Reflexes, Planter Reflexes, Moro's Reflex, Sucking Reflex, Rooting Reflex, Babinski reflex, Parachute Reflex, Asymmetric Tonic Neck Reflex, Symmetric Tonic Neck Reflex, Spinal Gallant Reflex, Stepping Reflex etc.

3. **Muscle tone**

Modified Ashworth scale

4. **Physical Examination:**

Any of the following **outcome measures** are used for tools to evaluate the gross motor functional level and manual ability level.

- GMFCS
- GMFM 88/66
- MACS/mini-MACS
- PEDICAT

The child can be examined in the following positions can examined under physical examination and they are; supine, prone, side lying, sitting, standing and walking. For each position, observations of the body symmetry, presence of Spasms, Neck /trunk control and Midline activity with both arms noted.

5. Diagnosis or the type of CP:

6. Treatment Plan and Recommendations

Treatment

Treatment aims to reach and maintain optimal physical function including hand function. Every child with cerebral palsy belong to specific groups namely Group 1 to Group 4. Each group's treatment is based on the goals that are needed to be achieved. The following are the details of the treatment protocol of each group;

GROUP 1

PLAN:

I. To train neck and trunk control

II. To teach rolling

III. Encourage midline activities

IV. Encourage weight bearing on the lower limb if the child’s age has passed the standing and walking milestone.

TREATMENT:

I. Neck Control Exercises

II. Trunk control Exercises

III. Rolling Exercises (Supine to Prone, Prone to Supine)

IV. Midline activities in prone or supine

V. Standing exercises (passive, active-assisted and active)

GROUP 2

PLAN:

I. improve Trunk Control

II. train side-lying to Sitting

III. Train sitting independently

IV. teach hand activities in sitting or assisted sitting position

V. Encourage weight bearing on the lower limb if the child’s age has passed the standing and walking milestone.

TREATMENT:

I. Trunk Control Exercises

II. Sitting activities (propping up, upright sitting with support at pelvis)

III. hand activities in sitting through play

IV. Standing exercises (passive, active-assisted and active)

GROUP 3

PLAN:

I. To train crawling

II. Train half kneeling and high kneeling

III. Transition from kneeling to standing

IV. Train independent standing and encourage weight bearing on the lower limb.

TREATMENT:

I. Crawling exercises

II. Half Kneeling exercises

III. Kneeling to Standing exercises

IV. Standing exercises (passive, active-assisted and active)

Group 4 A

PLAN

I. Walking habilitation

TREATMENT:

I. Side to side walking

II. Walking in parallel bar, without obstacles—-with obstacles

III. Walking on treadmill.

GROUP 4B****

PLAN: Teach the use of assistive device.

TREATMENT

1. Walking with a pair of callipers and crutches
2. Walking with zimmer frames or anterior walkers
3. Walking with posterior walkers

Review

Reviews are done after every 6 sessions of treatment. When the condition of the child improves, they are advanced to the next group until their frequency of visits are reduced depending on their progress with respect to the goals. Reviews are the assessment room with the therapist, child and the caregiver.

To conclude, the paediatric unit of the physiotherapy department has been efficient and has seen significant improvement in the condition of children with cerebral palsy.

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Paediatric Physiotherapy unit.

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Date: 17th January, 2023.

APPENDIX 29: REPORT ON CEREBRAL PALSY MANAGEMENT AT THE KORLE-BU TEACHING HOSPITAL.

Korle-bu Teaching Hospital is one of the major referral Hospitals in Ghana. It was established on the 9th October, 1923. Currently the Korle-bu Teaching Hospital has 14 Sub divisions called sub-BMC's (Sub-Budget and management Committee) has several clinical departments and the physiotherapy department happens to be one of them. It has been in operation for the past 24 years. The physiotherapy department has various units and they are the orthopedic, surgical, medical, burns and plastics, cardio thoracic unit, out-patient unit and the pediatric unit.

The pediatric unit covers the Neonatal Intensive Care Unit, the out-patient pediatrics units and work in collaboration with pediatric wards under the child Health Department. This unit is designed to improve the abilities of children with congenital conditions and young people following major injury, illness or medical procedures which affect their function. Paediatric rehabilitation programs aim to maximize the ability of the child to participate in activities at home, school and the community. One of the many pediatric conditions we treat at this unit is Cerebral palsy. Children with this condition are referred from other Hospitals or the Child Health Department of the Korle-bu teaching Hospital. They are seen once a week on either Tuesdays or Thursdays depending on their scheduled appointments until their attendance is gradually reduced based on their improvements. The unit has 3 physiotherapists and 3 assistants attending to these cases. The assistants work under the supervision of the physiotherapists. Each child is seen at a maximum time of 60 mins or 1 hour. The physiotherapists assess every new case, plan the treatment, treat, review and discharge cases that have improved. All cases whether new or old are recorded in a daily attendance register. These recordings are also done in a computerized system called the LHIMS (Lightwave Health Information Management System).

Assessment

Each patient is assessed using a designed assessment protocol for cerebral palsy. The physiotherapist subjectively receives information from the caregivers on the history of the condition, followed by an objective assessment of the child. This involves the following general observations of the child's;

- Vision: able to track objects, vertically /horizontally
- Hearing: turn towards the source of sound, startle
- Communication- cry, make sounds, talk

- Physical impairment

Muscle tone

1. At rest
2. During movement

Reflexes eg. Moro’s reflex, asymmetric tonic neck reflex, stepping, Babinski etc

Achievement of developmental milestones

Functional assessment

1. Gross motor skills
2. Fine motor skills
3. Transfers
4. Activities of daily living

Problems identified

How to curb the risks

Physical impression

Outcome measures: which also includes GMFM, CFC, MACS, and GMFCS.

Treatment plan

Treatment

Discharge

Approach to treatment

Treatment uses the problem centered approach and the following are the main goals for treatment.

1. To facilitate function at all levels of GMFCS.
2. Maintain and improve function at all levels of GMFCS
3. Provision of orthotics and assistive devises to prevent further complications of contracture eg. AFOS, KAFOS, gaiters, APT standing frames and seats.

Treatments given are;

- Passive mobilizations

- 4-point kneeling exercises while encouraging reaching activities and mid line activities.
- Sitting exercises both actively and passively with APT Seat or corner seat
- Passive standing exercises in the APT stander and Active Standing exercises
- Transitional exercises such as lying to sitting, sitting to standing and standing to walking
- Stair climbing exercises
- Walking exercises by the parallel bar
- Exercises mainly aimed at the use of the hands to train fie motor skills

Name: Anthony Twum Owusu

Designation: Senior Physiotherapist, Clinical Supervisor and Unit Head

Signature:

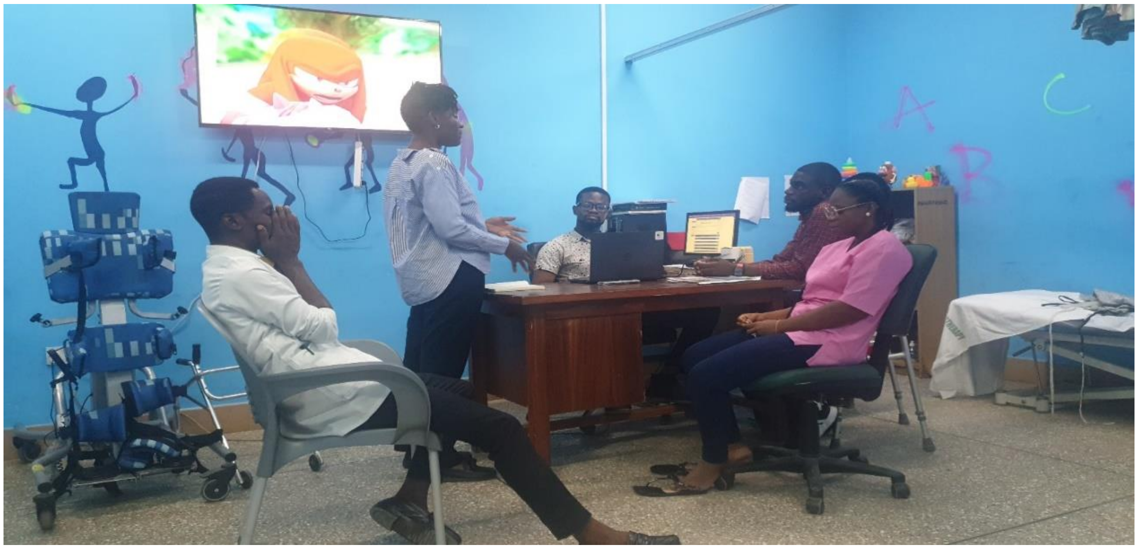
Date: 23rd January, 2023.

APPENDIX 30: PICTURES OF THE RESEARCH ACTIVITIES

Pictures of the research assistant sitting in to observe an interview performed by the researcher (consent was sought from caregiver to take photograph).

FACE TO FACE MEETING WITH THERAPISTS AT KORLE-BU AND HO TEACHING HOSPITALS.

A face- to-face meeting with Therapists from Korle-bu Teaching Hospital (Individualized Physiotherapy Treatment Model) (consent sought for the photos)



A face-to face meeting with Therapists from Ho Teaching Hospital (Group Physiotherapy Treatment Model) (consent sought for photos).

RESEARCHER AND ASSISTANT FILLING CONSENT FORMS

PICTURES OF RESEARCHER TAKING THE CAREGIVERS THROUGH THE CONSENT FORMS, TAKING A CHILD THROUGH AN ASSENT FORM AND ALSO FILLING THE CAREGIVER QUESTIONNAIRES (PHOTO CONSENT SOUGHT).

PICTURES OF THE RESEARCH ASSISTANT ADMINISTERING THE CAREGIVER QUESTIONNAIRES AND CONSENT WAS SOUGHT BEFORE PICTURES WERE TAKEN (PHOTO CONSENT SOUGHT).

PICTURES OF TREATMENT SESSIONS AT THE KORLE-BU TEACHING HOSPITAL (ON A NORMAL DAY)

TREATMENT TIME AT KORLE-BU TEACHING HOSPITAL ON A NORMAL DAY (PHOTO CONSENT SOUGHT)

A THERAPIST TAKING A CHILD THROUGH STANDING EXERCISES BY THE WALL BAR (PHOTO CONSENT SOUGHT).

A THERAPIST PERFORMING NECK CONTROL EXS ON THE MAT WITH THE CHID IN PRONE AND THE CAREGIVER SITTING IN TO OBSERVE THE TREATMENT (PHOTO CONSENT SOUGHT).

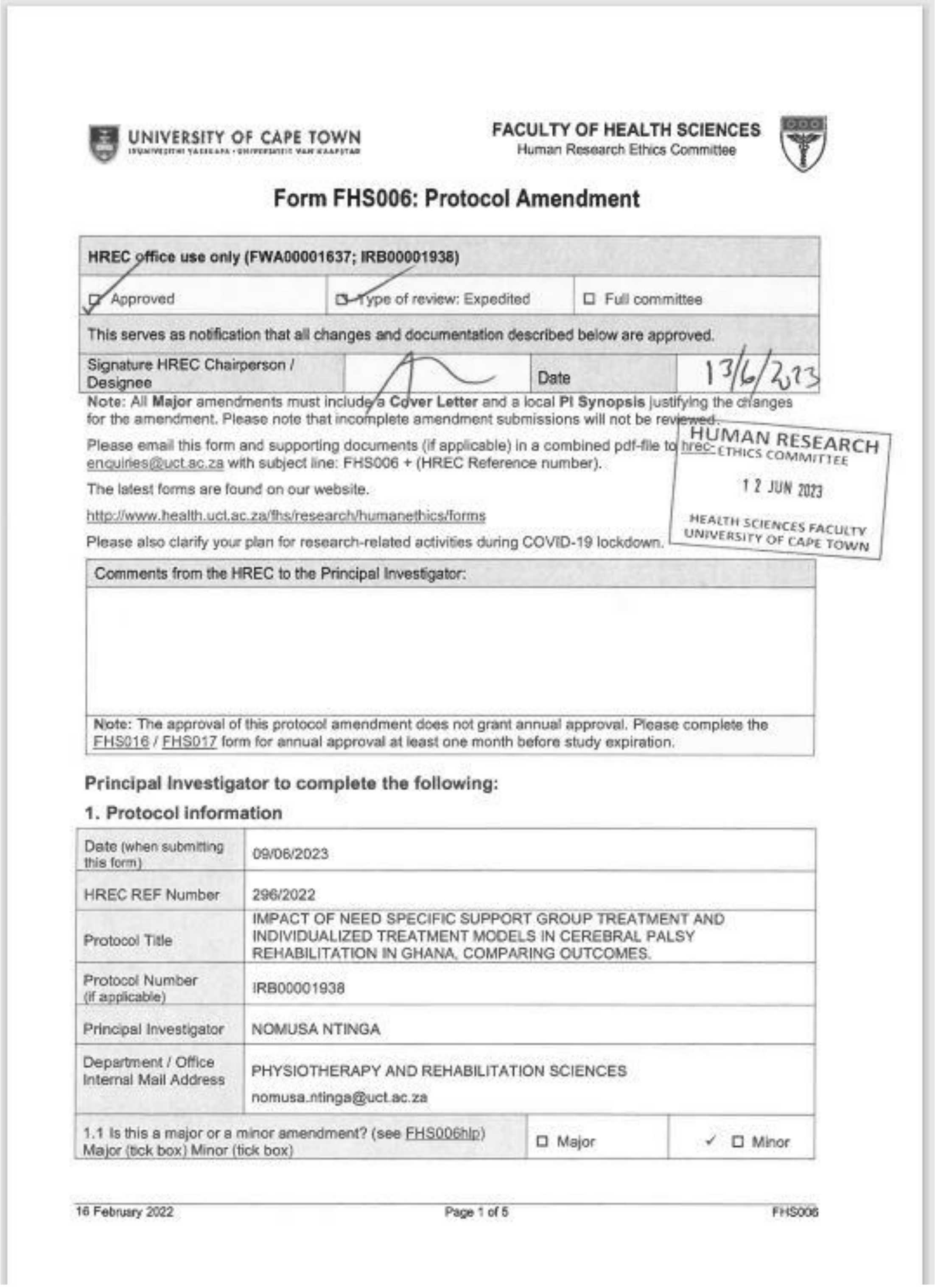
PICTURES OF TREATMENT SESSIONS AT THE HO TEACHING HOSPITAL (ON A NORMAL DAY)

Caregivers having an interactive session with their therapist while performing the exercises together on a normal Group 1 session (photo consent sought).

Caregivers trained by the Therapist and the other pictures showing caregivers taking their Children through sitting exercises while performing Hand function activities in Group 2 on a normal therapy day (photo consent sought).

caregivers taking their children through walking activities (photo consent sought).

APPENDIX 31: CHANGE OF THESIS TITLE APPROVAL FROM HREC



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FACULTY OF HEALTH SCIENCES
Human Research Ethics Committee

Form FHS006: Protocol Amendment

HREC office use only (FWA00001637; IRB00001938)			
☑ Approved	☑ Type of review: Expedited		☐ Full committee
This serves as notification that all changes and documentation described below are approved.			
Signature HREC Chairperson / Designee		Date	13/6/2023

Note: All **Major** amendments must include a **Cover Letter** and a local **PI Synopsis** justifying the changes for the amendment. Please note that incomplete amendment submissions will not be reviewed.

Please email this form and supporting documents (if applicable) in a combined pdf-file to hrec-enquiries@uct.ac.za with subject line: FHS006 + (HREC Reference number).

The latest forms are found on our website.

http://www.health.uct.ac.za/fhs/research/humanethics/forms

Please also clarify your plan for research-related activities during COVID-19 lockdown.

HUMAN RESEARCH ETHICS COMMITTEE
12 JUN 2023
HEALTH SCIENCES FACULTY
UNIVERSITY OF CAPE TOWN

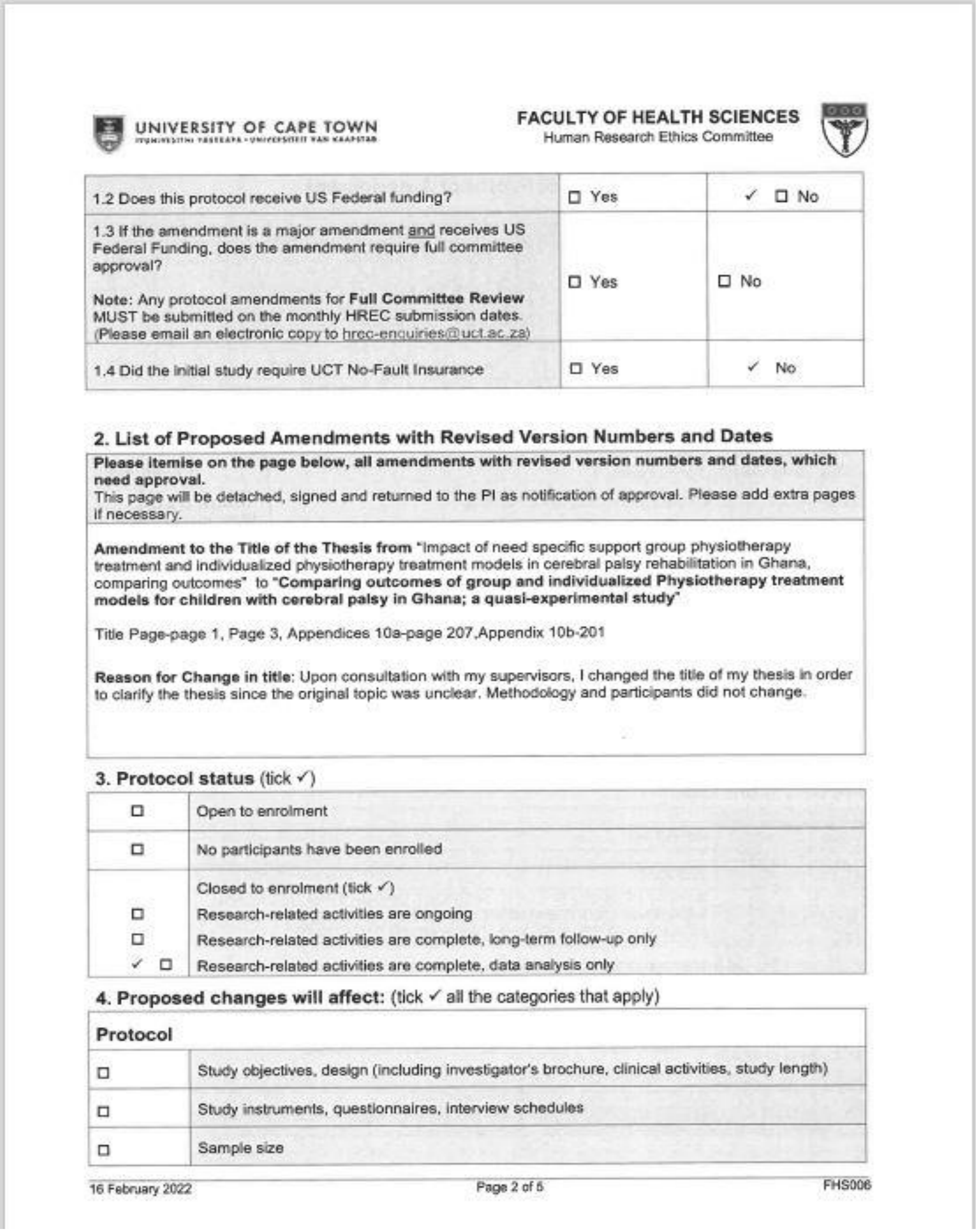
Comments from the HREC to the Principal Investigator:
Note: The approval of this protocol amendment does not grant annual approval. Please complete the FHS016 / FHS017 form for annual approval at least one month before study expiration.

Principal Investigator to complete the following:

1. Protocol information

Date (when submitting this form)	09/06/2023	
HREC REF Number	296/2022	
Protocol Title	IMPACT OF NEED SPECIFIC SUPPORT GROUP TREATMENT AND INDIVIDUALIZED TREATMENT MODELS IN CEREBRAL PALSY REHABILITATION IN GHANA, COMPARING OUTCOMES.	
Protocol Number (if applicable)	IRB00001938	
Principal Investigator	NOMUSA NTINGA	
Department / Office Internal Mail Address	PHYSIOTHERAPY AND REHABILITATION SCIENCES nomusa.ntinga@uct.ac.za	
1.1 Is this a major or a minor amendment? (see FHS006hlp) Major (tick box) Minor (tick box)	☐ Major	✓ ☐ Minor

16 February 2022 Page 1 of 5 FHS006



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1.2 Does this protocol receive US Federal funding?	☐ Yes	✓ ☐ No
1.3 If the amendment is a major amendment <u>and</u> receives US Federal Funding, does the amendment require full committee approval? **Note:** Any protocol amendments for **Full Committee Review** MUST be submitted on the monthly HREC submission dates. (Please email an electronic copy to hrec-enquiries@uct.ac.za)	☐ Yes	☐ No
1.4 Did the initial study require UCT No-Fault Insurance	☐ Yes	✓ No

2. List of Proposed Amendments with Revised Version Numbers and Dates

Please itemise on the page below, all amendments with revised version numbers and dates, which need approval.
This page will be detached, signed and returned to the PI as notification of approval. Please add extra pages if necessary.

Amendment to the Title of the Thesis from "Impact of need specific support group physiotherapy treatment and individualized physiotherapy treatment models in cerebral palsy rehabilitation in Ghana, comparing outcomes" to "**Comparing outcomes of group and individualized Physiotherapy treatment models for children with cerebral palsy in Ghana; a quasi-experimental study**"

Title Page-page 1, Page 3, Appendices 10a-page 207,Appendix 10b-201

Reason for Change in title: Upon consultation with my supervisors, I changed the title of my thesis in order to clarify the thesis since the original topic was unclear. Methodology and participants did not change.

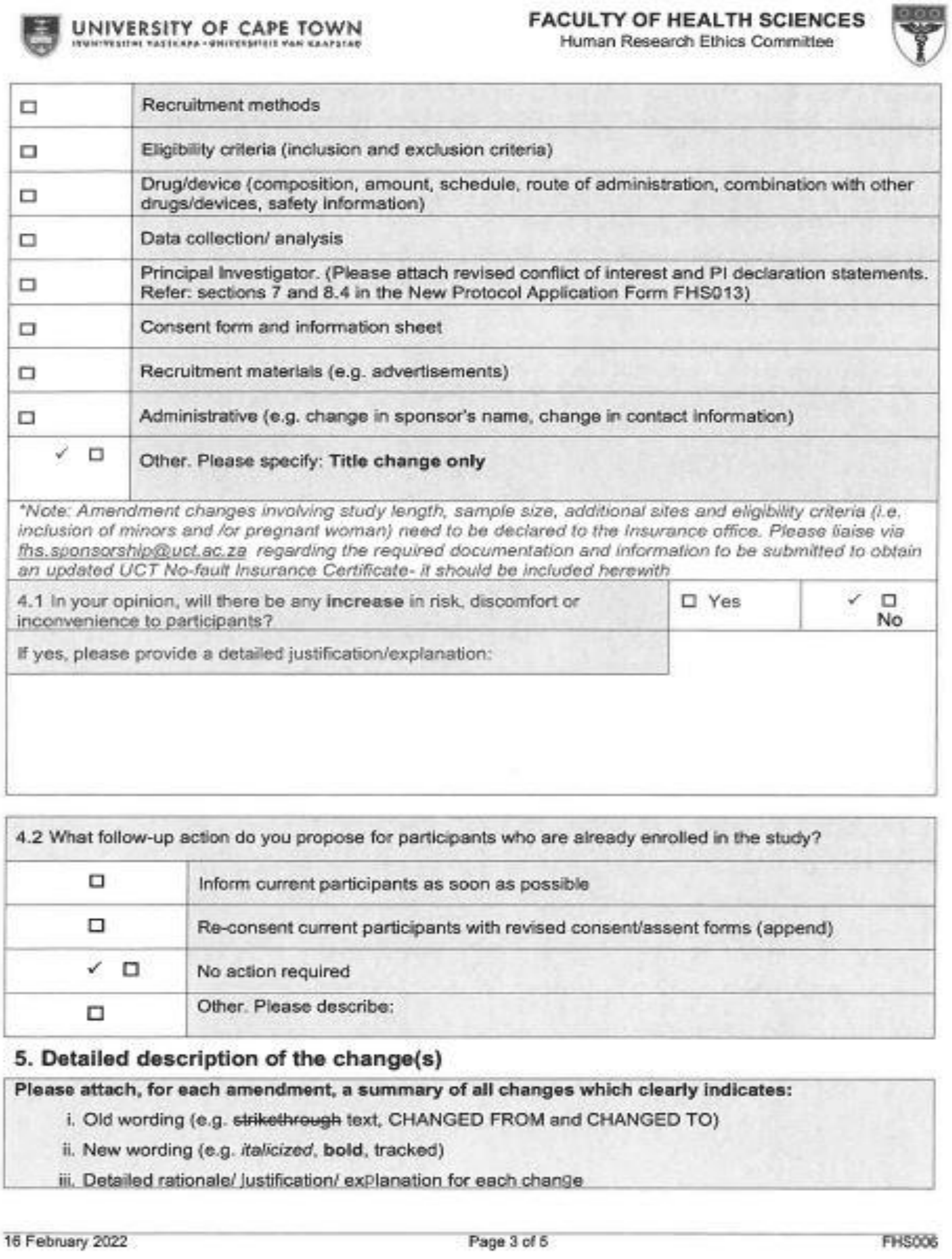
3. Protocol status (tick ✓)

☐	Open to enrolment
☐	No participants have been enrolled
	Closed to enrolment (tick ✓)
☐	Research-related activities are ongoing
☐	Research-related activities are complete, long-term follow-up only
✓ ☐	Research-related activities are complete, data analysis only

4. Proposed changes will affect: (tick ✓ all the categories that apply)

Protocol	
☐	Study objectives, design (including investigator's brochure, clinical activities, study length)
☐	Study instruments, questionnaires, interview schedules
☐	Sample size

16 February 2022 Page 2 of 5 FHS006



☐	Recruitment methods
☐	Eligibility criteria (inclusion and exclusion criteria)
☐	Drug/device (composition, amount, schedule, route of administration, combination with other drugs/devices, safety information)
☐	Data collection/ analysis
☐	Principal Investigator. (Please attach revised conflict of interest and PI declaration statements. Refer: sections 7 and 8.4 in the New Protocol Application Form FHS013)
☐	Consent form and information sheet
☐	Recruitment materials (e.g. advertisements)
☐	Administrative (e.g. change in sponsor's name, change in contact information)
✓ ☐	Other. Please specify: **Title change only**

**Note: Amendment changes involving study length, sample size, additional sites and eligibility criteria (i.e. inclusion of minors and /or pregnant woman) need to be declared to the Insurance office. Please liaise via fhs.sponsorship@uct.ac.za regarding the required documentation and information to be submitted to obtain an updated UCT No-fault Insurance Certificate- it should be included herewith*

4.1 In your opinion, will there be any **increase** in risk, discomfort or inconvenience to participants?	☐ Yes	✓ ☐ No
If yes, please provide a detailed justification/explanation:		

4.2 What follow-up action do you propose for participants who are already enrolled in the study?	
☐	Inform current participants as soon as possible
☐	Re-consent current participants with revised consent/assent forms (append)
✓ ☐	No action required
☐	Other. Please describe:

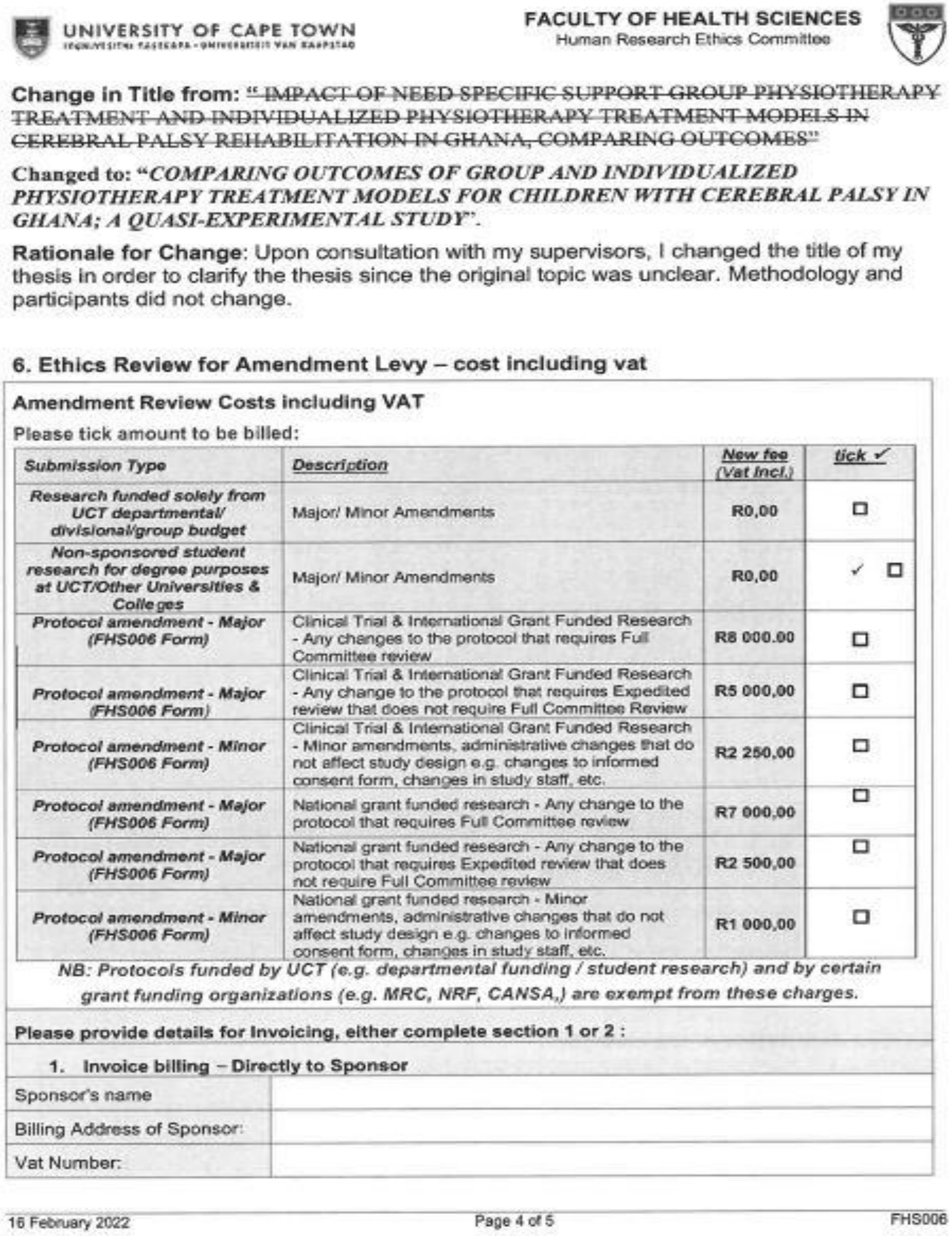
5. Detailed description of the change(s)

Please attach, for each amendment, a summary of all changes which clearly indicates:

i. Old wording (e.g. ~~strikethrough~~ text, CHANGED FROM and CHANGED TO)

ii. New wording (e.g. *italicized*, **bold**, tracked)

iii. Detailed rationale/ justification/ explanation for each change



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Change in Title from: ~~" IMPACT OF NEED SPECIFIC SUPPORT GROUP PHYSIOTHERAPY TREATMENT AND INDIVIDUALIZED PHYSIOTHERAPY TREATMENT MODELS IN CEREBRAL PALSY REHABILITATION IN GHANA, COMPARING OUTCOMES"~~

Changed to: "*COMPARING OUTCOMES OF GROUP AND INDIVIDUALIZED PHYSIOTHERAPY TREATMENT MODELS FOR CHILDREN WITH CEREBRAL PALSY IN GHANA; A QUASI-EXPERIMENTAL STUDY*".

Rationale for Change: Upon consultation with my supervisors, I changed the title of my thesis in order to clarify the thesis since the original topic was unclear. Methodology and participants did not change.

6. Ethics Review for Amendment Levy – cost including vat

Amendment Review Costs including VAT

Please tick amount to be billed:

Submission Type	***Description***	***New fee (Vat Incl.)***	***tick ✓***
Research funded solely from UCT departmental/ divisional/group budget	Major/ Minor Amendments	**R0,00**	☐
Non-sponsored student research for degree purposes at UCT/Other Universities & Colleges	Major/ Minor Amendments	**R0,00**	✓ ☐
Protocol amendment - Major (FHS006 Form)	Clinical Trial & International Grant Funded Research - Any changes to the protocol that requires Full Committee review	**R8 000.00**	☐
Protocol amendment - Major (FHS006 Form)	Clinical Trial & International Grant Funded Research - Any change to the protocol that requires Expedited review that does not require Full Committee Review	**R5 000,00**	☐
Protocol amendment - Minor (FHS006 Form)	Clinical Trial & International Grant Funded Research - Minor amendments, administrative changes that do not affect study design e.g. changes to informed consent form, changes in study staff, etc.	**R2 250,00**	☐
Protocol amendment - Major (FHS006 Form)	National grant funded research - Any change to the protocol that requires Full Committee review	**R7 000,00**	☐
Protocol amendment - Major (FHS006 Form)	National grant funded research - Any change to the protocol that requires Expedited review that does not require Full Committee review	**R2 500,00**	☐
Protocol amendment - Minor (FHS006 Form)	National grant funded research - Minor amendments, administrative changes that do not affect study design e.g. changes to informed consent form, changes in study staff, etc.	**R1 000,00**	☐

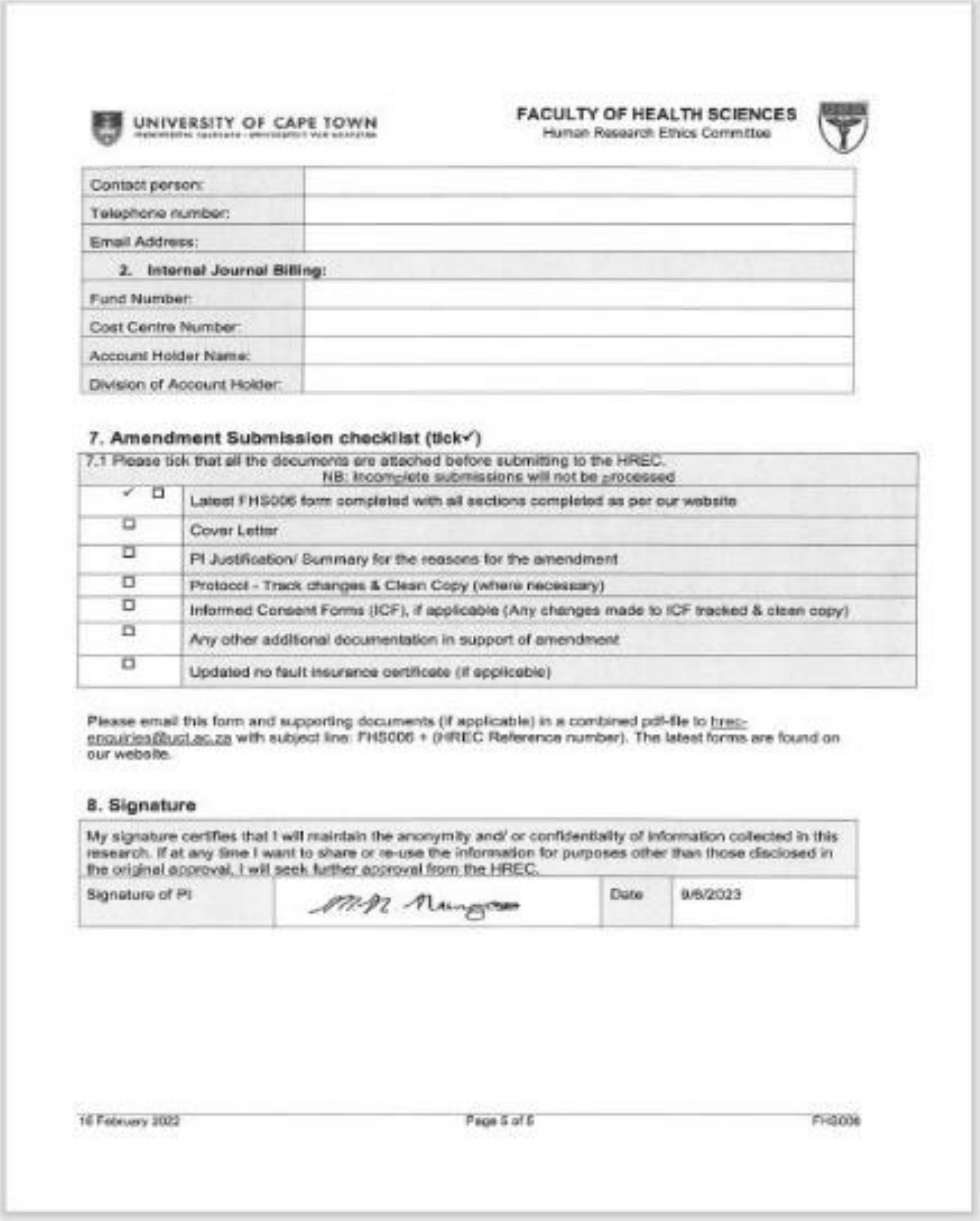
NB: Protocols funded by UCT (e.g. departmental funding / student research) and by certain grant funding organizations (e.g. MRC, NRF, CANSA,) are exempt from these charges.

Please provide details for Invoicing, either complete section 1 or 2 :

1. Invoice billing – Directly to Sponsor

Sponsor's name	
Billing Address of Sponsor:	
Vat Number:	

16 February 2022 Page 4 of 5 FHS006



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Contact person:	
Telephone number:	
Email Address:	
2. Internal Journal Billing:	
Fund Number:	
Cost Centre Number:	
Account Holder Name:	
Division of Account Holder:	

7. Amendment Submission checklist (tick✓)

7.1 Please tick that all the documents are attached before submitting to the HREC. NB: Incomplete submissions will not be processed	
✓ ☐	Latest FHS006 form completed with all sections completed as per our website
☐	Cover Letter
☐	PI Justification/ Summary for the reasons for the amendment
☐	Protocol - Track changes & Clean Copy (where necessary)
☐	Informed Consent Forms (ICF), if applicable (Any changes made to ICF tracked & clean copy)
☐	Any other additional documentation in support of amendment
☐	Updated no fault insurance certificate (if applicable)

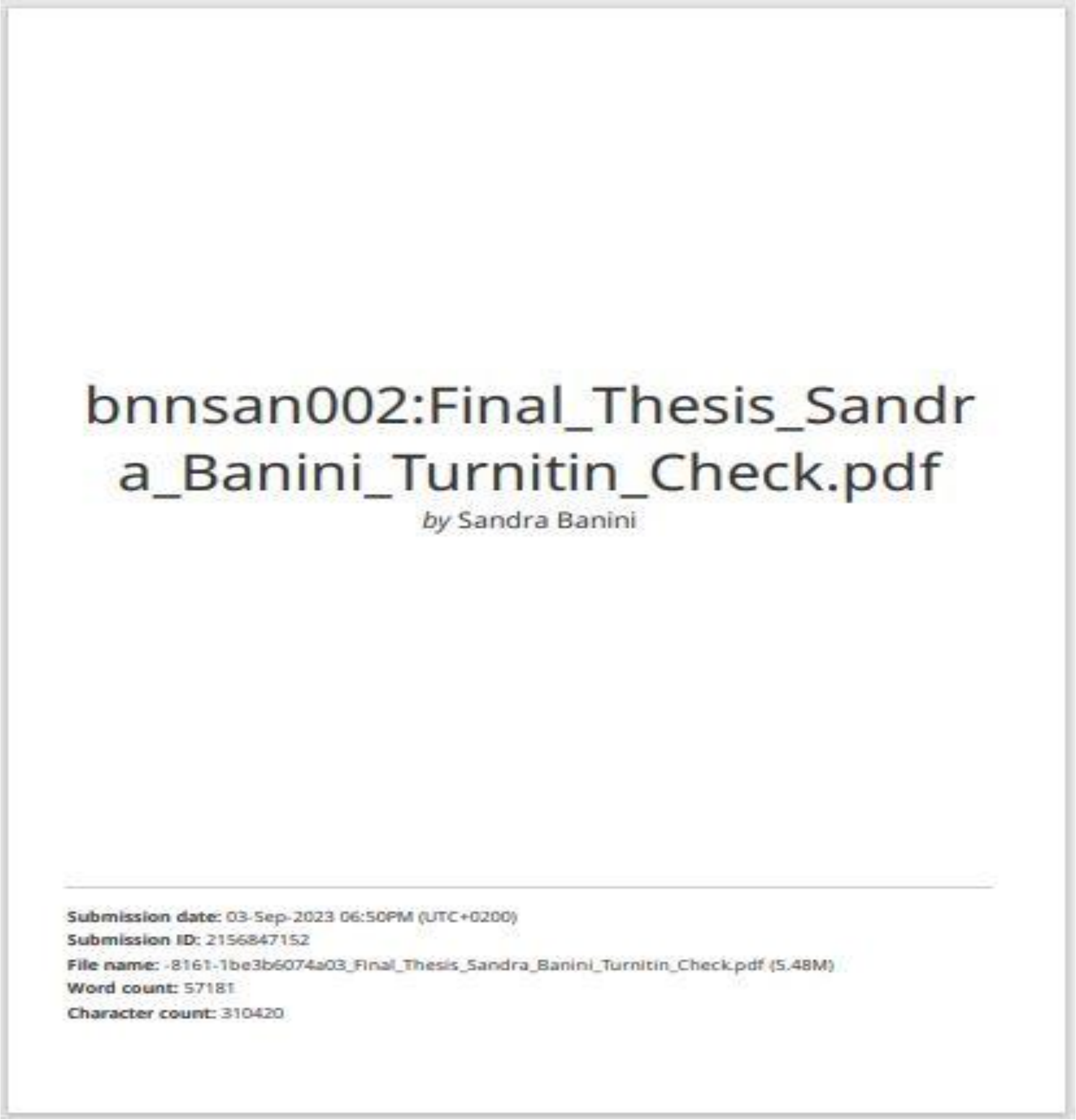
Please email this form and supporting documents (if applicable) in a combined pdf-file to hrec-enquiries@uct.ac.za with subject line: FHS006 + (HREC Reference number). The latest forms are found on our website.

8. Signature

My signature certifies that I will maintain the anonymity and/ or confidentiality of information collected in this research. If at any time I want to share or re-use the information for purposes other than those disclosed in the original approval, I will seek further approval from the HREC.			
Signature of PI		Date	9/6/2023

16 February 2022 Page 5 of 5 FHS006

APPENDIX 32 : PLAGIARISM REPORT



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by Sandra Banini

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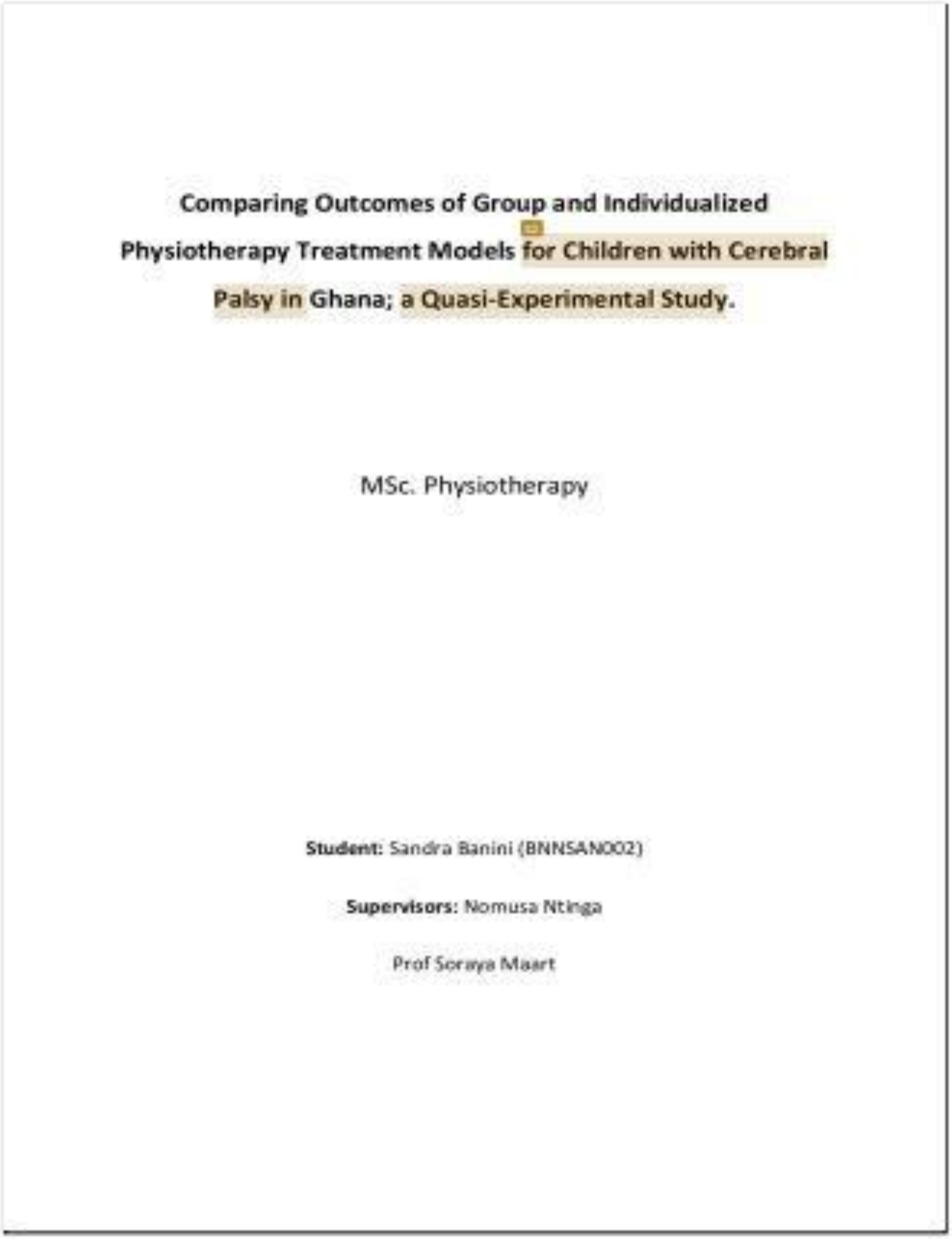
Character count: 310420

Student: Sandra Banini **Supervisor: Nomusa Ntinga**

Signed by candidate

Signature: ……. **Signature:**

Date: 3/9/2023 **Date: 5/9/2023**



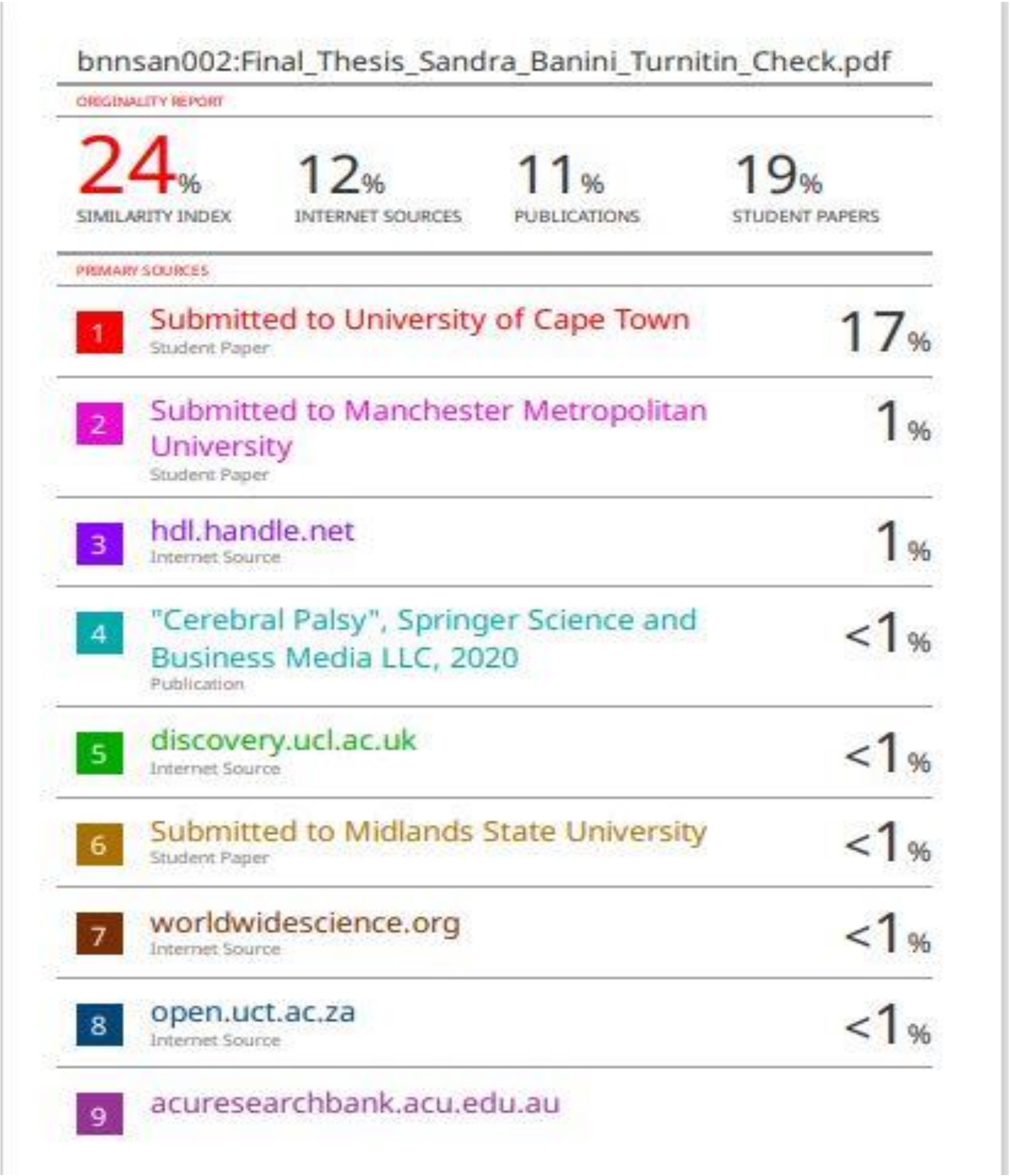
Comparing Outcomes of Group and Individualized Physiotherapy Treatment Models for Children with Cerebral Palsy in Ghana; a Quasi-Experimental Study.

MSc. Physiotherapy

Student: Sandra Banini (BNNSAN002)

Supervisors: Nomusa Ntinga

Prof Soraya Maart



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SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

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2	Submitted to Manchester Metropolitan University Student Paper	1%
3	hdl.handle.net Internet Source	1%
4	"Cerebral Palsy", Springer Science and Business Media LLC, 2020 Publication	<1%
5	discovery.ucl.ac.uk Internet Source	<1%
6	Submitted to Midlands State University Student Paper	<1%
7	worldwidescience.org Internet Source	<1%
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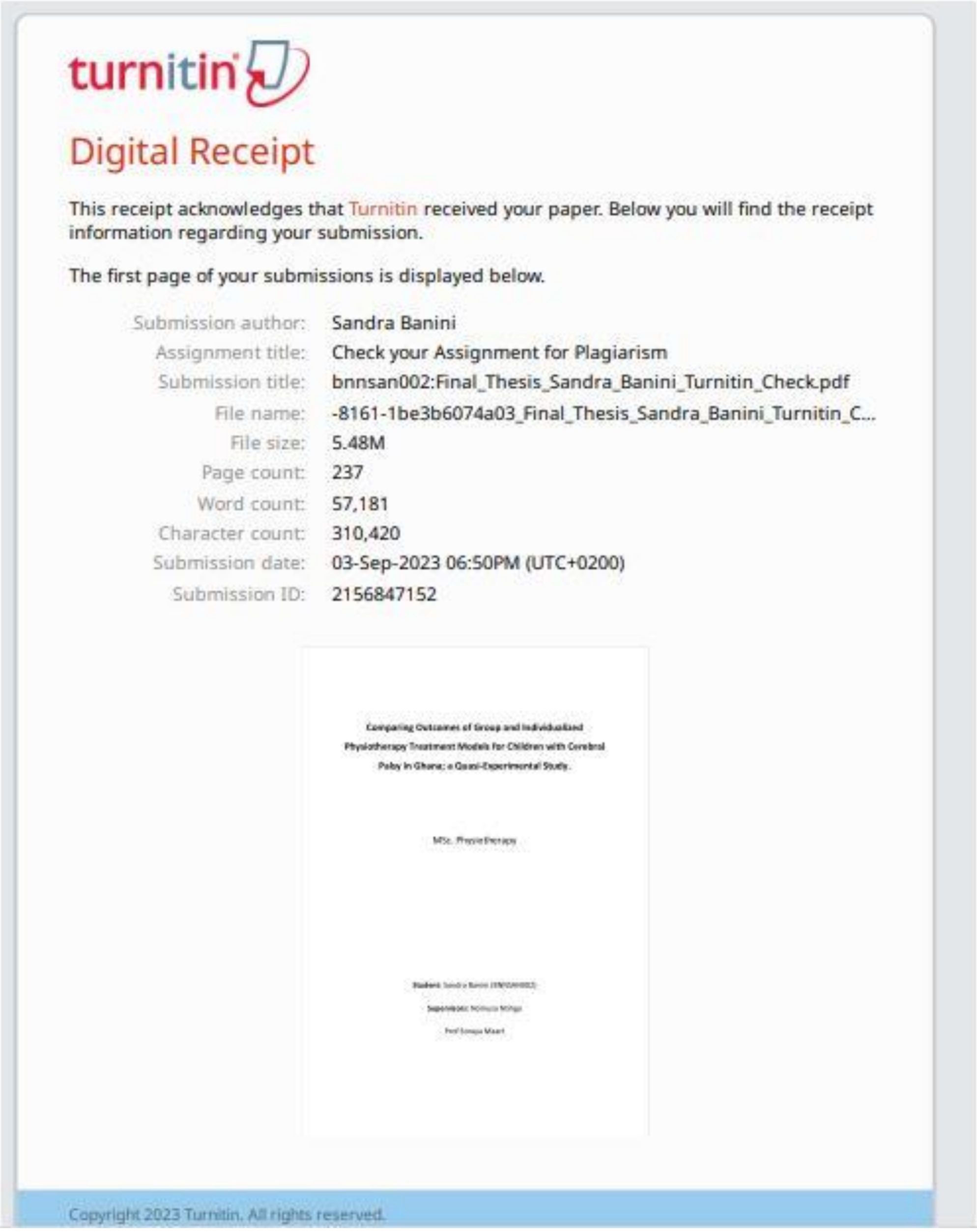

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